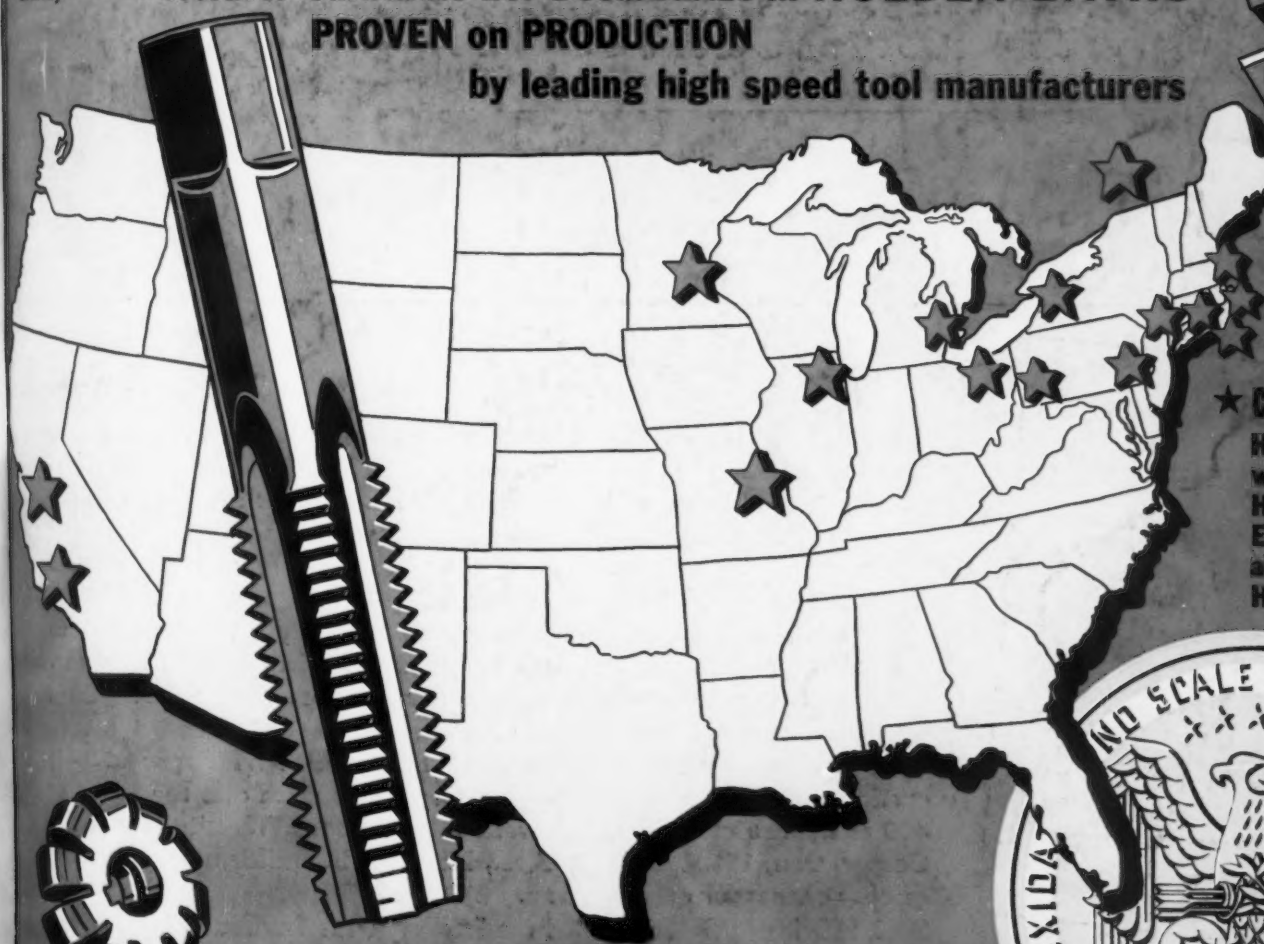


SEPTEMBER 4, 1941

The IRON AGE

MOLYBDENUM HIGH SPEED TOOLS

Neither Carburize nor Decarburize in HOLDEN BATHS
PROVEN on PRODUCTION
by leading high speed tool manufacturers



★ Commercial Service
Holden Engineers
will advise where
Holden Salt Bath
Equipment is available for Commercial
Hardening.

EQUIPMENT

Complete Hardening UNITS
installed and guaranteed by
HOLDEN ENGINEERS

BASE METALS BEHAVE LIKE NOBLE METALS IN HOLDEN BATHS

THE A. F. HOLDEN COMPANY

New Haven, Conn.

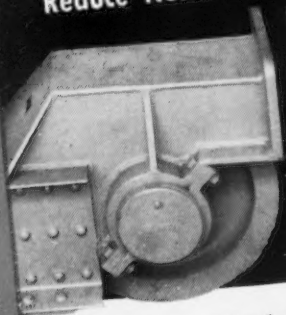


**THIS CRANE
IS REALLY
QUIET**



***Yes - and that means
it will wear longer***

**Rotating Axle Bearings
Reduce Noise and Wear in
WHITING
CRANES**



The forged steel axle is supported by heavy-duty roller bearings. Wheels run true and free.

Noise is not only a disturbing sound—it is a sure sign of expense. It means friction, excessive wear, high maintenance charges, and time-consuming shut-downs. That's why Whiting cranes are designed for quiet operation. A quiet crane is a long-wearing crane.

Many features have been incorporated in Whiting cranes to reduce noise and wear and to give efficient, trouble-free, high-speed operation. Quiet-running herringbone gears outlast ordinary spur gears two to one. Heavy-duty roller bearings keep the gears in perfect alignment. Tapered tread drive wheels reduce flange wear. Flexible couplings cushion shock, and rotating-axle bearings run free.

When you buy a crane, be sure to buy a quiet Whiting crane. It will give you longer wear. Capacities from one to 400 tons; also electric hoists from ½ to 7½ tons. Whiting Corporation, 15601 Lathrop Ave., Harvey, Ill. Builders of quality cranes for over 50 years.

SEND FOR BOOKLET "How to Write a Traveling Crane Specification"



WHITING *Quiet-Running*
OVERHEAD TRAVELING CRANES

SEPTEMBER 4, 1941

VOL. 148, NO. 10



J. H. VAN DEVENTER
President and Editor

C. S. BAUR
Vice-President and General Manager

o o o

Managing Editor, T. W. LIPPERT
News & Markets Editor, J. A. ROWAN
Machine Tool Editor, F. J. OLIVER

Associate Editors

D. R. JAMES T. E. LLOYD
W. A. PHAIR G. RICCIARDI

Art Editor, F. J. WINTERS

Editorial Assistants

M. M. SCHIEN G. B. WILLIAMS
J. I. BUTZNER S. H. BARMASEL

Washington Editors

L. W. MOFFETT JAMES G. ELLIS

Resident District Editors

T. C. CAMPBELL HERMAN L. KLEIN
Pittsburgh Chicago
B. W. CORRADO W. F. SHERMAN
Cleveland Detroit

CHARLES POST
San Francisco

Editorial Correspondents

W. P. DEARING ROBERT G. MCINTOSH
Buffalo Cincinnati

G. FRAZAR RAY KAY
Boston Los Angeles

HUGH SHARP JOHN C. McCUNE
Milwaukee Birmingham

F. SANDERSON ROY M. EDMONDS
Toronto, Ontario St. Louis

L. W. ALLISON C. H. BACON
Newark, N. J. Seattle

o o o

A. H. DIX, Manager Reader Service

o o o

Advertising Staff

Emerson Findley } 621 Union Bldg., Cleveland
Robert F. Blair }

B. L. Herman, Chilton Bldg., Philadelphia

H. K. Hattenstein, 1012 Otis Bldg., Chicago

H. E. Leonard, 100 East 42nd St., New York

Peirce Lewis, 7310 Woodward Ave., Detroit

C. H. Ober, 100 East 42nd St., New York

W. B. Robinson } 428 Park Bldg., Pittsburgh
W. J. Fitzgerald }

D. C. Warren, P. O. Box 81, Hartford, Conn.

Don F. Harner, 1595 Pacific Avenue, Long Beach, Cal.

O. L. Johnson, Market Research Mgr.

B. H. Hayes, Production Manager.

R. E. Baur, Typography and Layout.

o o o

Member, Audit Bureau of Circulations

Member, Associated Business Papers

Indexed in the Industrial Arts Index. Pub-

lished every Thursday. Subscription Price

United States and Possessions, Mexico, Cuba,

\$6.00; Canada, \$8.50; Foreign, \$12.00 a year.

Single copy, 25 cents.

Cable Address "Ironage N. Y."

o o o

Owned and Published by

CHILTON COMPANY

(Incorporated)

Executive

Office

Editorial and

Advertising Offices

Chestnut and 56th Sts. 100 East 42nd St.

Philadelphia, Pa. New York, N. Y.

U.S.A. U.S.A.

OFFICERS AND DIRECTORS

C. A. MUSSELMAN, President

JOS. S. HILDRETH, Vice-President

GEORGE H. GRIFFITHS, Vice-President

EVERIT B. TERHUNE, Vice-President

J. H. VAN DEVENTER, Vice-President

C. S. BAUR, Vice-President

WILLIAM A. BARBER, Treasurer

JOHN BLAIR MOFFETT, Secretary

JULIAN CHASE, THOMAS L. KANE,

G. C. BUZBY, P. M. FAHRENDORF,

HARRY V. DUFFY CHARLES J. HEALE

This Week in . . .

THE IRON AGE

Editorial

The Horseshoe Nail 35

Technical Articles

Hot Pressing of Iron Powders 37

Installs Billet Scarfer 45

Die Cast Shell Fuse Parts 46

Austenite Grain Size 51

Pre-Heat Treated Alloy Steel 54

Etching Technique 56

Permanent Mold Casting 62

Features

Assembly Line 64

Washington 68

The West Coast 72

Fatigue Cracks 76

News and Markets

This Industrial Week 78

News of Industry 81

Government Awards 109

Personals and Obituaries 116

Construction Steel 118

Non-Ferrous Metals 121

Machine Tool Activity 122

Scrap Markets 124

Iron and Steel Scrap Prices 126

Comparison of Prices 127

Finished Steel Prices 128

Warehouse Prices 129

Sales Possibilities 134

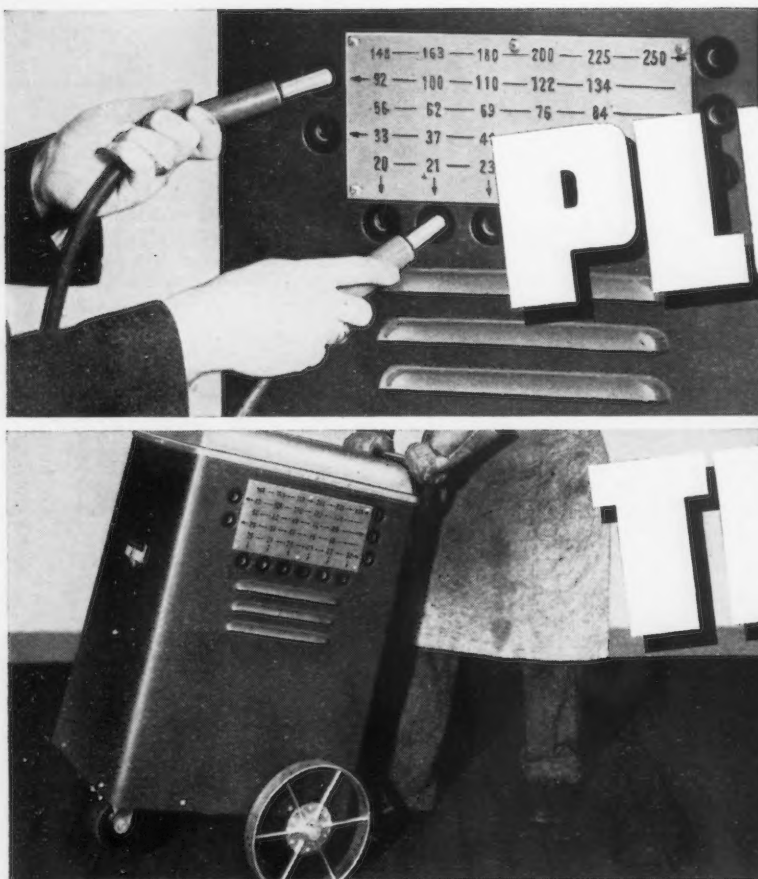
o o o

Products Advertised 150

Index to Advertisers 189

Copyright, 1941, by Chilton Company (Inc.)





PLUG-IN

AND WELD

TIP-UP

AND MOVE!

WELDING'S QUICK AND EASY WITH THIS HUSKY ALL-PURPOSE A-C WELDER!

Plug in the welding current you need from 27 clearly marked steps between 20 and 250 amperes—and weld! This FlexArc a-c welder gives you all the advantages of a-c welding in a complete, easy-to-handle unit, ready to go to work—and husky enough for any round-the-shop general use!

When the job is done, tip it back and roll it away. Built-in "De-ion" breaker protects it against sustained overloads and permits disconnecting at the machine. Price includes helmet with lens, welding leads, scratch-brush, electrode holder, primary cable and 17 lbs. of electrodes.* See your nearest Westinghouse Welding Dealer or write Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

*Type SW Westinghouse Electrodes



ONLY

\$198⁰⁰

COMPLETE
WITH ALL
ACCESSORIES

Westinghouse

FLEXARC A-C WELDERS



THE IRON AGE

° °
SEPTEMBER 4, 1941

° °
ESTABLISHED 1855



The Horseshoe Nail

EVERY so often, but not too often, some wise philosopher drops a pearl of wisdom so perfect that it becomes permanently mounted in man's diadem of memory. In other words, it becomes a proverb, a parable, a saying or an old saw; the words of which are familiar to everybody but the meaning of which is heeded by very few.

Such, for example, is the famous story of the battle and the war that was lost for want of a horseshoe nail.

A horseshoe nail! You couldn't expect princes and kings and generals and colonels to descend from the grand strategy of armies and regiments to the consideration of such dime-a-dozen trivia. You couldn't expect statesmen and political bigwigs and other public figures to wrestle in time of war with less formidable figures than trillions of yen, billions of rubles or millions of mazukas.

But, unfortunately, for battles and for wars, while the super-strategists and the political bigwigs are thinking at an altitude of thousands of feet above cloud level, some little thing happens down on the ground, like the lack of the nail, and the enemy wins the war.

Consider some of the many little things that we make in this country that are too close to the ground to receive attention from priority thinkers.

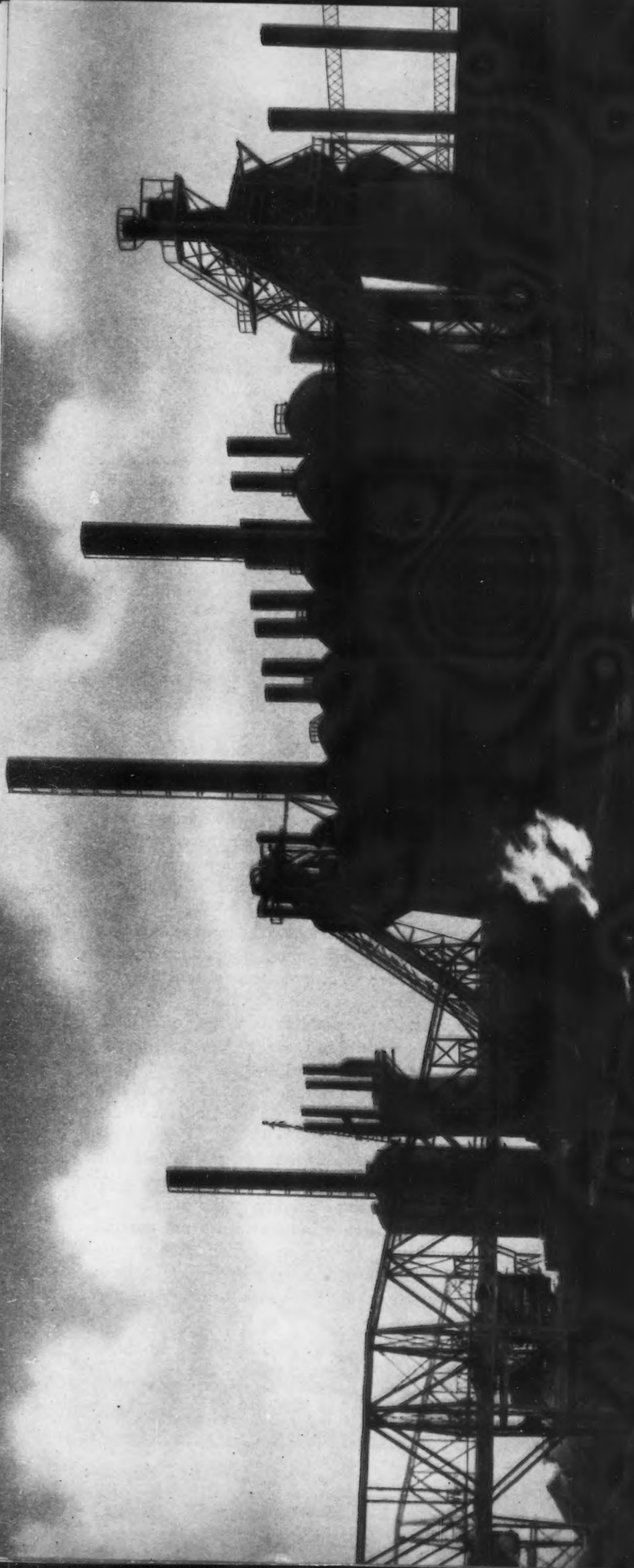
Take nuts, bolts and rivets. The man who makes them cannot tell where they are going. He is too far away from the original defense orders to know. Yet there is hardly a single implement of war that you could name that could be completed without them.

Take standard gears, pulleys and belts. The man who makes them does not know where they are going and hence cannot allocate them to a priority order. Yet every wheel that turns in our defense program, anywhere, depends upon them.

Take small electric motors, pyrometers and any of a thousand minor products that are made in quantity lots and distributed through dealers. Chances are that the majority of these products will go into defense industries or necessary supplying industries, but the maker cannot prove it. His product is too near to the ground.

And finally, take dollars. They say that we are not yet in a shooting war, but we are shooting billions of dollars overseas at Hitler. Why not consider giving some priority to the people who make dollars. Our so-called defense industries are not making them, they are using them up. Dollars are expendable ammunition. But you can reload those that you take from private profits; not those that you draw from the public treasury.

J. W. Van Duren



Only Uniform Quality Raw Materials Are Used In Inland Furnaces

Piled high on Inland mill docks are great quantities of uniform quality raw materials—coal, from which the best metallurgical coke is made—pure limestone, especially prepared for Inland blast furnace use—basic iron ores that are care-

fully selected; and specialty ores for blending to meet special requirements. A continuous flow of uniform, high quality raw materials from Inland owned and controlled sources is an important factor in the production of Inland quality steel.

INLAND STEEL CO., 38 So. Dearborn St., Chicago

Hot-Pressing of Iron Powders

—Powder metallurgy, the rapidly growing and comparatively new metal working technique, is today of considerable importance in the country's defense effort. Thus, these new data on the surprising physical properties obtained by hot-pressing and also the types of dies to use, are particularly timely.

THE art of powder metallurgy has within the past few years gained considerable importance as a means for manufacturing finished or semi-finished products and today contributes its share to the national defense program. The method of compressing metallic powders in dies and heating the resulting compacts to a temperature somewhat below their melting point in order to obtain solid metallic bodies of predetermined shape offers certain advantages. These include:

Savings of raw materials due to the complete elimination of scrap, faulty castings, excess metal, and metallic additions to facilitate melting or pouring. Saving of machine tools and labor due to the molding of the powders into final shapes are also factors of primary concern today.

In view of the strategic metal situation confronting this country, the powder metallurgy of iron and

steel has gained considerable importance during recent months. There is little doubt that in the near future molded iron parts will be used for numerous new applications and in certain cases will replace present non-ferrous objects.

A survey of the present-day state of ferrous powder metallurgy discloses certain important facts:

(1) So far all ferrous metal powder parts are based on iron powder as raw material. Different types of iron powder are commercially available: reduced sponge, electrolytic and pulverized scrap are the chief kinds. Their relatively high market value in comparison with stock iron is one of the greatest handicaps in the development of the art. In addition the qualities of these powders are by no means always satisfactory and greatly depend upon specific manufacturing conditions. Compacting and sintering qualities are not only different for each type, but often vary considerably within the same kind of powder. Plasticity of the powder particles is important for the mold-

By PAUL SCHWARZKOPF

and

CLAUS G. GOETZEL

*American Electro Metal Corp.,
Yonkers, N. Y.*

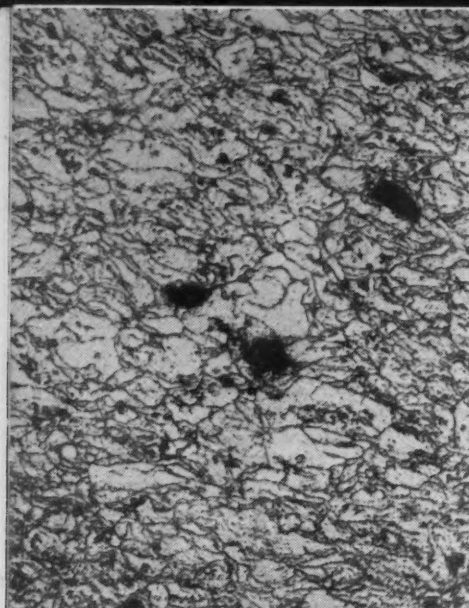
ing operation and the behavior of the powder briquettes during the sintering process affects the securing of close tolerances of

the sintered parts.

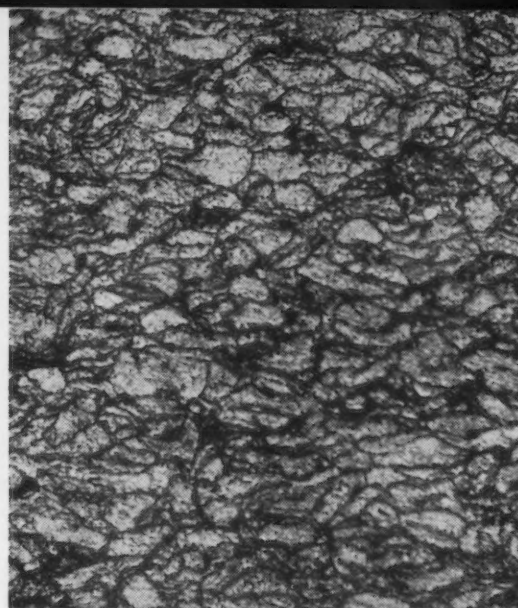
(2) So far sintered iron is used almost exclusively for porous parts, such as bearings, oil pump gears, etc. Strength and ductility characteristics of such parts are of only minor importance, while close control of porosity and the introduction of lubricants is essential. Addition of graphite improves lubrication, and at the same time, due to partial diffusion of the carbon into the porous iron mass, promotes a steel-like structure which sometimes displays slightly improved physical characteristics. Additional carburization of the iron may be obtained by sintering in controlled carburizing atmospheres.

(3) Information on the development of dense sintered iron and steel parts of properties close to those of wrought iron is extremely scarce. It is generally known that density and physical characteris-

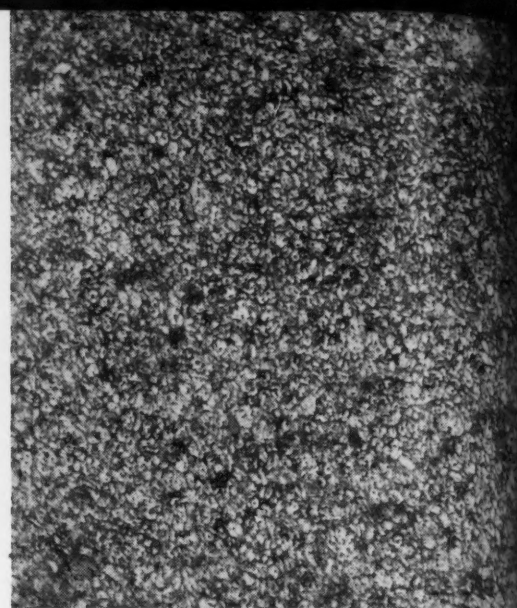
For other important articles on powder metallurgy, see THE IRON AGE, Sept. 19 and Dec. 19, 1940, and April 17, 1941.



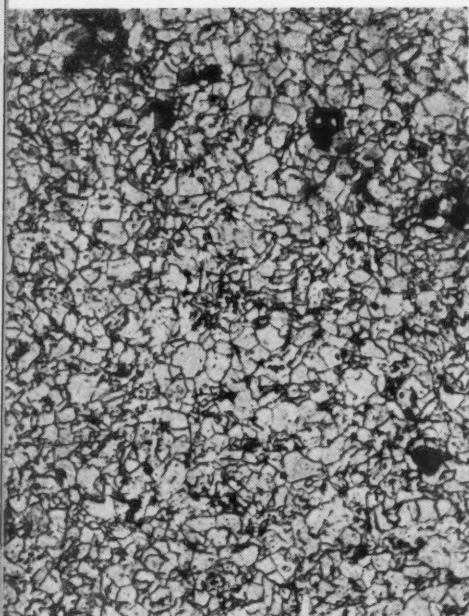
Pressed at 500 deg. C., 50 tons per sq. in.



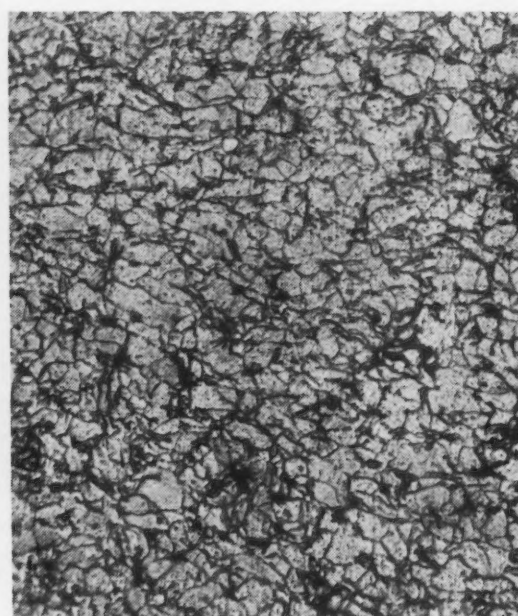
Pressed at 500 deg. C., 30 tons per sq. in.



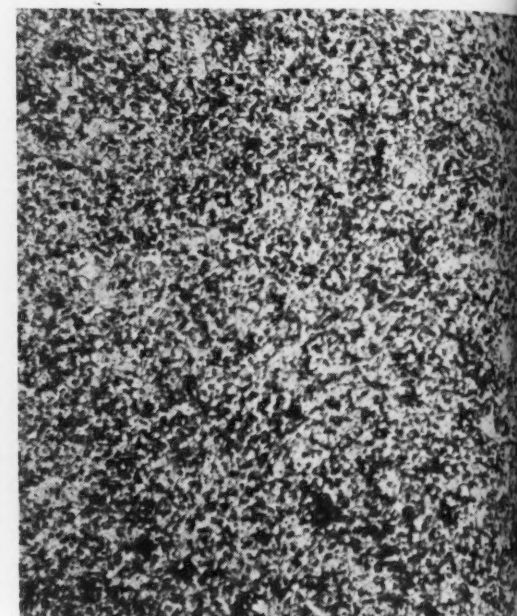
Pressed at 500 deg. C., 50 tons per sq. in.



Pressed at 900 deg. C., 2 1/2 tons per sq. in.



Pressed at 900 deg. C., 2 1/2 tons per sq. in.



Pressed at 900 deg. C., 2 1/2 tons per sq. in.

Fig. 1. Photomicrographs of compacts hot-pressed at various temperatures and

tics of sintered metals are influenced by the following factors:

- (1) Nature of metal under consideration.
- (2) Plasticity of powder.
- (3) Particle size distribution.
- (4) Molding pressure.
- (5) Sintering temperature.
- (6) Sintering time.
- (7) Atmospheric conditions during sintering.
- (8) Type of subsequent treatment.

However all these factors are subject to either technical or economic limitations.

In Table I the average physical properties of sintered iron, as collected from publications or determined by the authors' own experiments, are compared with electrolytic, fused and annealed iron. From this table it is quite

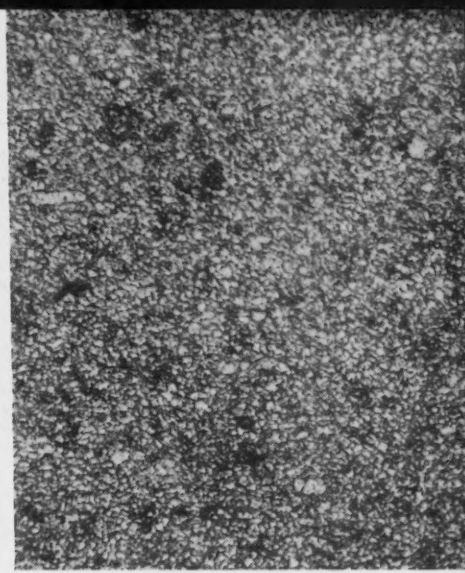
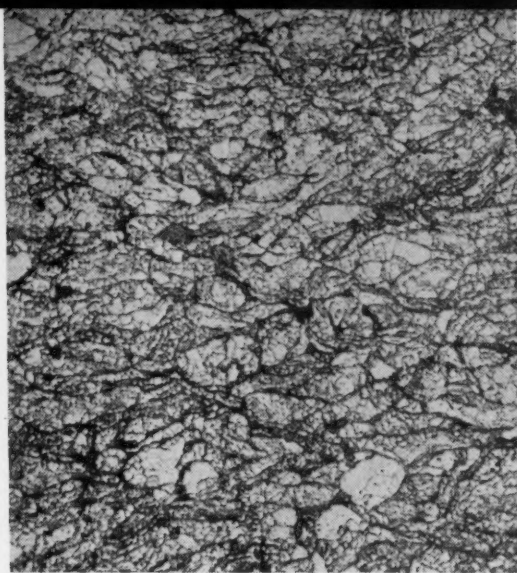
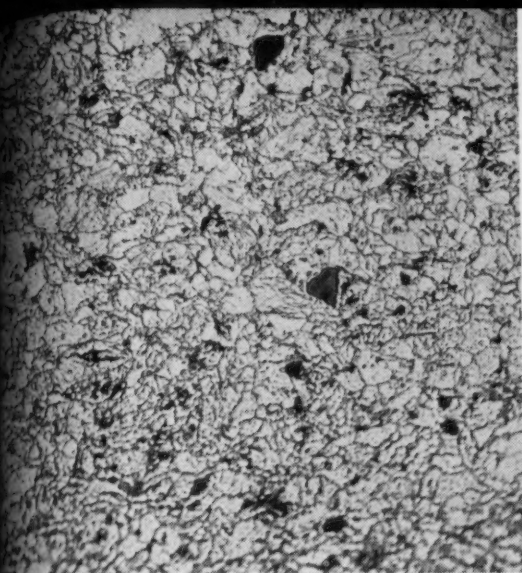
evident that even under the most favorable conditions the physical properties of sintered iron are below those of the bulk metal. While the density of such compacts may come to within 7 to 10 per cent of normal, and while hardness and tensile properties reach 75 to 90 per cent of the figures for electrolytic iron, elongation and reduction in area values fall as low as 1/4 to 1/2 of those for the electrolytic metal.

(4) On the basis of experience and of available information it appears doubtful whether the physical properties as given in Table I can be greatly improved by even the closest control of the factors as mentioned above, with the exception of item (8), type of subsequent treatment.

It has been found that cold or hot working, such as rolling, forging, etc., subsequent to sintering of the compacts, may under certain conditions greatly improve the density and physical properties. In this connection, densities above 7.80, hardness value of 90 Brinell units, yield points above 30,000 lb. per sq. in. and tensile strength values surpassing 50,000 lb. per sq. in. were found, with elongations reaching 35 per cent and reduction in area figures reaching 60 per cent, e. g., both within 10 to 20 per cent of corresponding data for ingot iron forgings.

Hot Pressed Iron

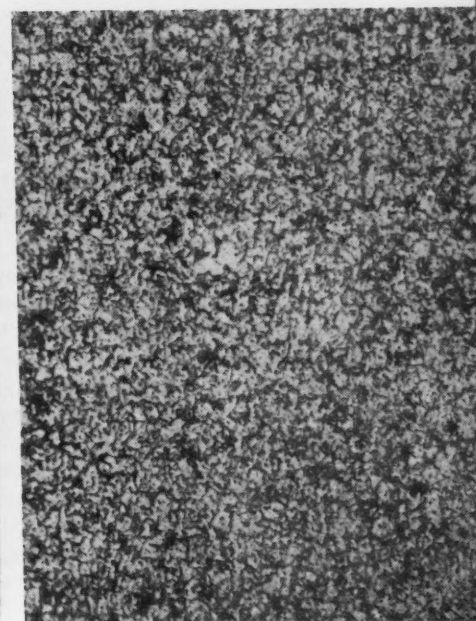
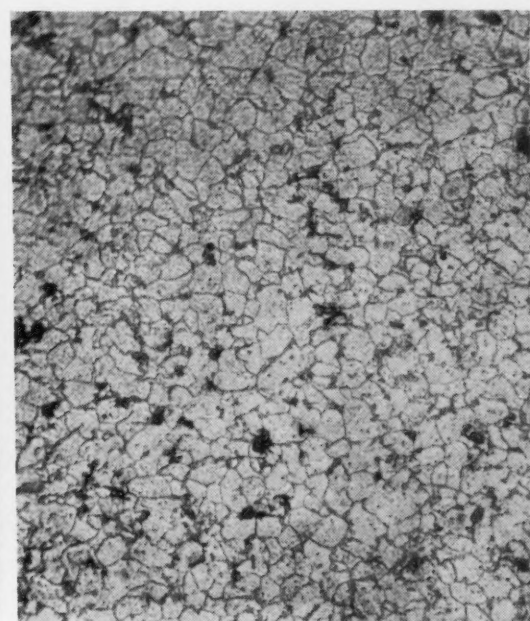
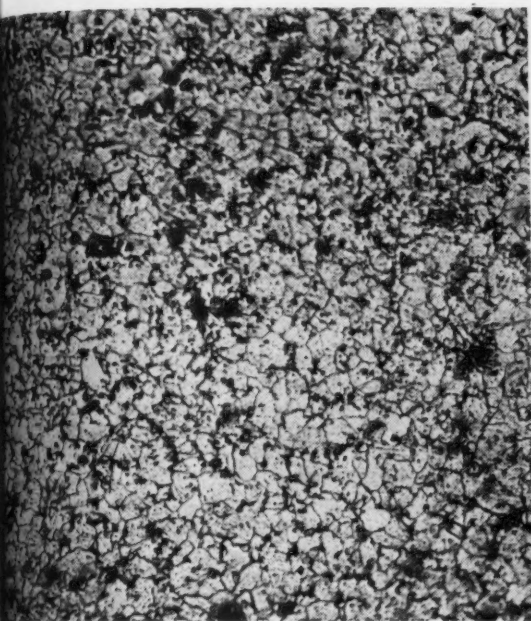
The desirability of combining the consolidating effects of a hot working procedure with a technique for



Pressed at 800 deg. C., 10 tons per sq. in.

Pressed at 600 deg. C., 30 tons per sq. in.

Pressed at 800 deg. C., 10 tons per sq. in.



Pressed at 1100 deg. C., 1 1/2 tons per sq. in.

Pressed at 1100 deg. C., 1 1/2 tons per sq. in.

Pressed at 1100 deg. C., 1 ton per sq. in.

pressures from the three different kinds of iron powder. At 200 diameters.

confining the parts to closely controlled dimensions during molding and sintering has brought up the question of hot-pressing of iron powders. As far back as 15 years

ago, Sauerwald made hot pressing experiments with iron. He reported tensile values of 38,000 lb. per sq. in., but gave no ductility figures. In view of the technique employed

by him, his studies may be considered as a classical example and until today little work has excelled his pioneer research. Most of the later investigations have utilized testing

TABLE I
Average Physical Properties of Sintered Iron

State and History of Metal	Density (Per Cent vs. Fe*)	Brinell Hardness	Yield Strength, Lb. Per Sq. In.	Tensile Strength, Lb. Per Sq. In.	Elongation in Per Cent	Reduction in Area, Per Cent (In 2 In.)
Iron powder compacts, compressed, at 50 tons per sq. in.	77 to 83	70 to 75	none	400 to 500	none	none
Iron powder compacts compressed and sintered above 1000 deg. C.	83 to 88	40 to 50	none	25,000 to 30,000	8 to 12	8 to 12
Iron powder compacts, compressed, sin- tered and repressed at 50 tons per sq. in.	90 to 93	65 to 70	none	33,000 to 41,000	0 to 3	0 to 3
Iron powder compacts, compressed, sin- tered, repressed and resintered.	90 to 93	55 to 65	16,000 to 21,000	33,000 to 37,000	16 to 22	16 to 22
Electrolytic iron, fused and annealed.	100	45 to 90	10,000 to 20,000	35,000 to 40,000	40 to 60	70 to 90

*Taken as 7.87.

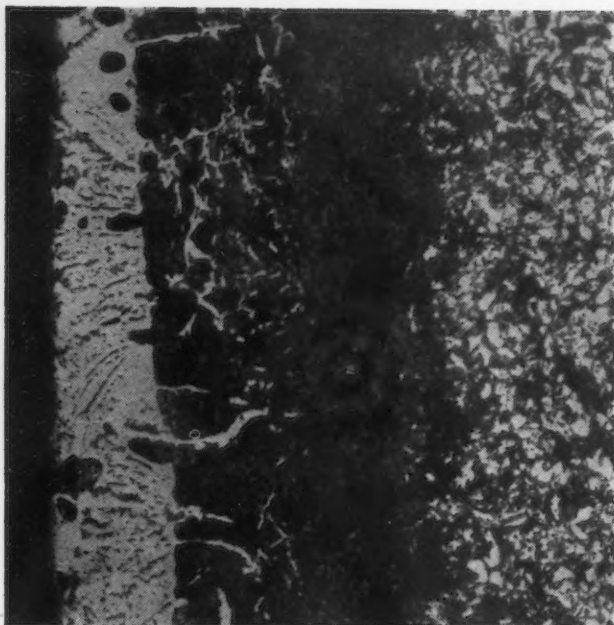


FIG. 2—Photomicrograph of edge of Swedish sponge iron compact hot-pressed at 1200 deg. C. and 1/2 ton per sq. in. in graphite die. Shown at 200 diameters.



FIG. 3—Swedish sponge iron compact after pressing at 1200 deg. C. and 1/2 ton per sq. in. in graphite die.

procedures of a more simple nature due to difficulties in die designing. While metallic dies have been used in most cases, the shape of the compacts has been confined to simple cylindrical bodies, suitable only for density, hardness or compressive strength testing. Tensile, impact, bending or conductivity tests would require long, rectangular test specimens, for which hot press dies would have been more difficult to design and operate.

However, it has recently come to the authors' attention that quite successful hot-pressing experiments with bar-shaped specimens from electrolytic iron powder have been carried out. Tensile strength values close to 60,000 lb. per sq. in. and elongation values approaching 40 per cent have been obtained with absolutely dense specimens. A procedure was used employing fairly

high pressure at which the specimens were kept for different periods of time under protective atmospheric conditions and at temperatures at which the iron was still ferritic.

In order to study the possibilities for hot-pressing of iron powder more closely, the authors initiated a series of experiments in which various important factors were subjected to close investigation. Original intentions for developing a technique permitting the making of bar-shaped specimens for tensile testing had to be abandoned for the time being for reasons of simplicity. Instead, it was decided to employ an apparatus with dies for cylindrical specimens 3/4 in. in diameter and 1/2 in. high which could be easily replaced in case of failure.

In view of the complexity of the

problem, work was concentrated on the effects of the following factors:

- (1) Type of initial powder.
- (2) Type of construction material for plungers and dies.
- (3) Hot-pressure temperature.
- (4) Hot-pressing pressure.
- (5) Hot-pressing cycle.
- (6) Subsequent annealing.

The influence of these factors was investigated by an analysis of the microstructure of the resulting compacts, and by testing of density and hardness. Special attention was paid to the question of an exact relationship between pressure and temperature and their mutual effect on the plasticity and density.

Raw Material

Three different types of iron powder were employed, namely:

- (1) Swedish sponge iron (all through 100 mesh).
- (2) Electrolytic iron (all through 100 mesh).
- (3) Hydrogen-reduced iron (all through 325 mesh).

In all cases the powders belonged to regular production lots and were bought on the market.

The Swedish iron was found to be rather impure, with a total iron content of not more than 96 per cent and having at least 1 per cent insoluble matter. However, due to the spongy nature of the individual particles, the powder displayed most favorable compressibility during cold pressing.

In contrast to this, the electrolytic powder used was of excellent

TABLE II

Pressure-Temperature Conversion Chart for Hot-Pressed Iron

Iron Powder	Density (Per Cent vs. Fe)	Room Temperature	Hot-Pressing Temperature						
			500 Deg. C.	600 Deg. C.	700 Deg. C.	800 Deg. C.	900 Deg. C.	1000 Deg. C.	1100 Deg. C.
Swedish Sponge, (-100)	90	(100)	19	10	(6)	(3)	2 1/2	(4)	(2)
	95	(150)	(35)	19	(10)	(5)	(4)	(6)	(4)
	100	(225)	(60)	30	(20)	(10)	(8)	(9)	(7)
Electrolytic, (-100)	90	(75)*	21	12	8	4	2 1/2	(4)	(3)
	90	(125)	24	10	6	3	1 1/2	---	---
	95	(200)	34	17	10	4	---	---	---
Hydrogen, reduced, (-325)	95	(125)	27	18	11	6	(4)	(6)	(5)
	100	(200)	(75)	(40)	(20)	(12)	(8)	(10)	(9)
	100	(300)	(70)	30	20	10	---	---	---

*Pressures in tons per sq. in.

purity (analyzing 99 per cent metallic Fe), although due to the difference in construction of the individual particles it was less plastic.

Still different was the behavior of the hydrogen-reduced iron powder. The purity of this powder closely approached that of the electrolytic material, but it was of much finer mesh size, and in addition of rather poor compressibility. The lack of plasticity may be explained by the extremely fine and regular-shaped particles, which also appeared to be embrittled by hydrogenization.

All three types of powders were subjected to a preliminary reduction in hydrogen at 750 deg. C. for 30 min. in order to remove surface films of oxide around the particles.

The experiments were divided in two parts; namely low-temperature hot-pressing, employing high-speed steel dies and plungers and high-temperature experiments, employing graphite dies and graphite or cemented carbide plungers.

The set-up used necessitated a pre-molding of the powders at room temperature and pressures below 10 tons per sq. in. into cylinders of slightly undersized diameter. These compacts were fed into the dies, preheated to the press temperature by high-frequency current. The press temperature was controlled and the compacts were surrounded by hydrogen during hot-pressing and cooling in a special two-chamber receiver. Experiments were made at temperatures ranging from 500 deg. to 800 deg. C. with the high-speed steel dies, and from 900 deg. to 1200 deg. C. with the graphite dies. Pressures varying between 10 and 50 tons per sq. in. in the former and between $\frac{1}{2}$ to $2\frac{1}{2}$ tons per sq. in. in the latter case, were applied. They were varied according to the press temperature. The selection of the pressures was influenced by considerations regarding the strength of the die materials used. For any temperature, five different pressures were applied in order to obtain sufficient values for conclusive curves.

The time during which the pressure was applied was generally kept at 1 min. but in a few instances was extended up to 10 min. Five minutes were allowed to lapse in each case for the attainment of temperature equilibrium after introduction of the compact into the hot-press die and before applying the pressure.

Duplicate specimens were sub-

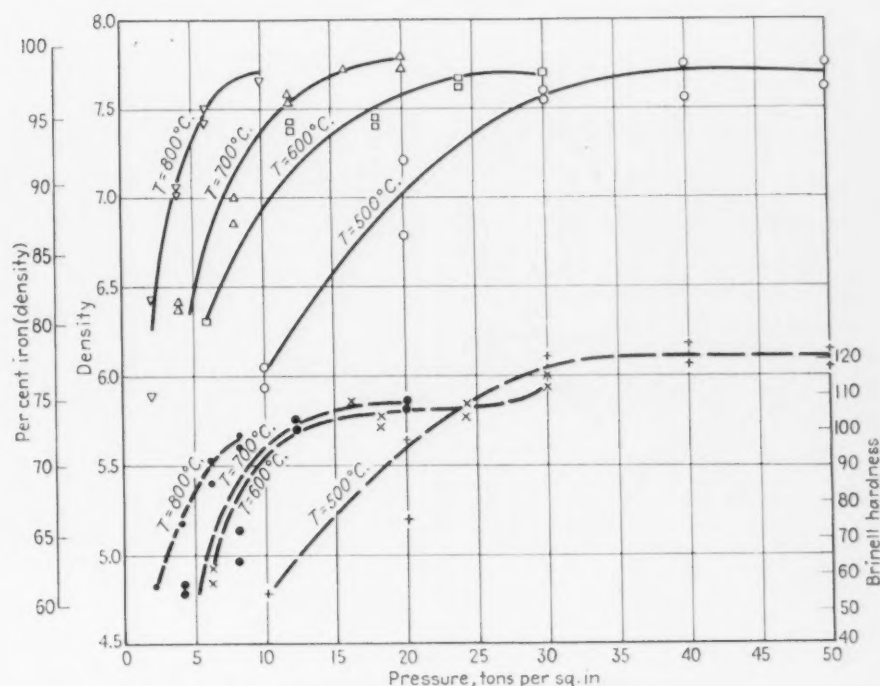


FIG. 4—Density and Brinell hardness vs. pressure; low-temperature hot-pressed Swedish sponge iron powder compacts.

sequently annealed in a hydrogen atmosphere in two cycles, namely:

- (a) At 1000 deg. C. for 2 hr.
- (b) At 1300 deg. C. for 1 hr.

Changes in the pressing temperature from 500 deg. to 800 deg. C. affected the microstructure only slightly. Above 600 deg. to 700 deg. C. indications pointed to recrystallization within the individual particles. On the other hand, the structure was noticeably changed at

press temperatures above 900 deg. C. In all cases, but especially in compacts made from the purer electrolytic and hydrogen-reduced powders a polygonal crystal structure of fine ferritic grains became apparent after pressing at or above 1000 deg. C. (see Fig. 1). Slight grain growth was also observed at the highest press temperatures used.

During the experiments at 1200

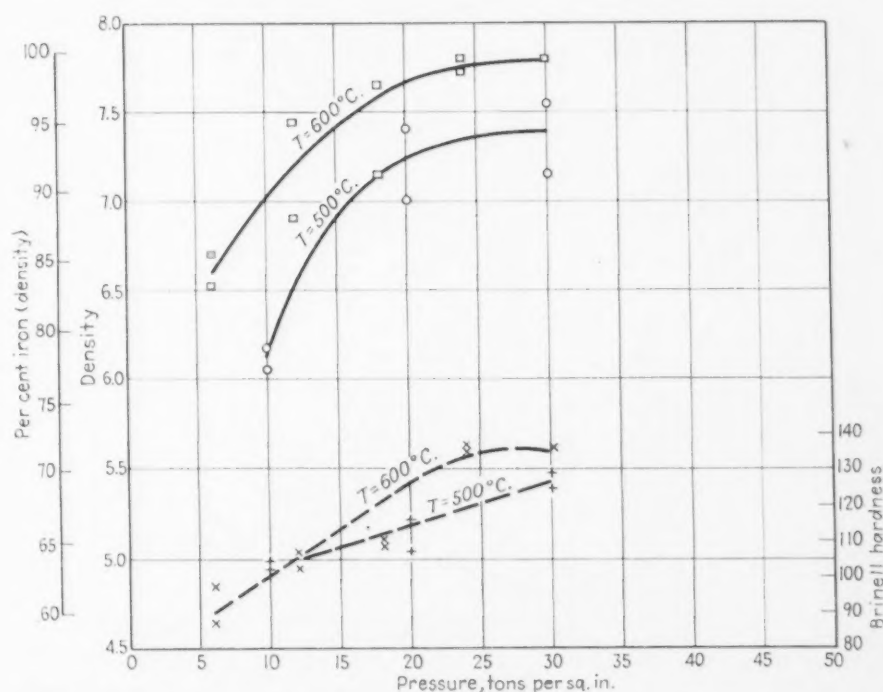


FIG. 5—Density and Brinell hardness vs. pressure; low-temperature hot-pressed electrolytic iron powder compacts.

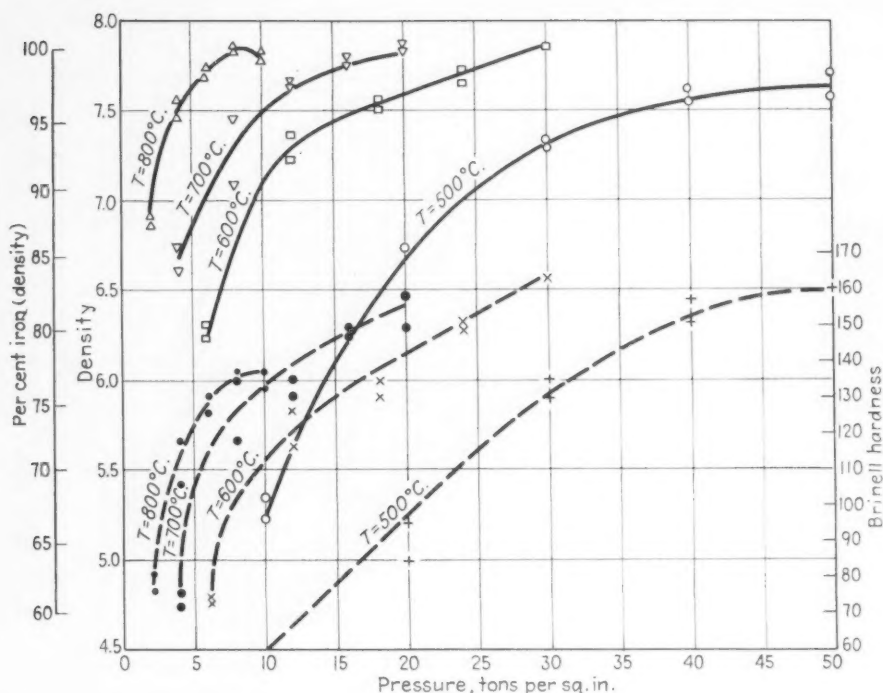


FIG. 6—Density and Brinell hardness vs. pressure; low-temperature hot-pressed hydrogen-reduced iron powder compacts.

deg. C. carbon from the graphite die diffused into the iron compacts thus forming materials of various concentrations of carbon. As shown in the photomicrograph of Fig. 2, cast iron was formed at the outer edge while the carbon decreased gradually to about 0.35 per cent C toward the center. During hot-pressing at 1200 deg. C. the cast iron shells became liquid (Fig. 3), which gave rise to considerable operating difficulties.

Generally speaking, an increase in hot-pressing temperature caused consolidation of the structure and crystallization at the higher temperatures.

Density of the compacts is much affected by rising pressing temperatures particularly for the low-temperature test series. However, it must be kept in mind that the properties are influenced by the pressure as well, so that the temperature effects are only relative and must be

judged in view of the pressure applied.

Only in the case of electrolytic and hydrogen-reduced iron powders could ideal densities be approached or reached at temperatures below 600 deg. to 800 deg. C. and correspondingly high pressures. This is remarkable in view of the proper molding qualities of these materials at room temperature in comparison with Swedish sponge.

The picture for the high-temperature test series is less encouraging. Probably due to the low pressures permissible, density values in general were much lower than for the low-temperature experiments. In no case did the density exceed 90 per cent of the ideal value.

Of particular interest is the fact that distinct minima were observed at 1000 deg. C. for all types of raw materials. It is conceivable that the marked drop in density between 900 deg. and 1000 deg. C. pressing temperature at identical pressures may have some connection with the allotropic change; indicating that the compacts, while entering the austenitic temperature range were more resistant to pressure than when still in the high-temperature ferrite range.

Hardness values drop gradually with increasing pressing temperature due to recovery phenomena above 600 deg. C. They are much higher in the case of the hydrogen-reduced fine iron than in any of the others, in certain cases exceeding 160 Brinell.

Lowest values were obtained with the Swedish sponge. Hardness figures are very low for all specimens of the high-temperature test series. Here the data follow closely the trend of the density figures and at 1000 deg. C. minima could again be observed.

Hot-Pressing Pressure

The consolidating effect of rising pressure upon the structure was distinctly noticeable for all initial powders and for each temperature at which experiments were made. Porosity diminished and the appearance of the structure became more normal. In many cases recrystallization was more pronounced in the compacts molded at the high pressures, as contact areas between the particles were increased in number and size and coalescence was facilitated. This was most clearly indicated in com-

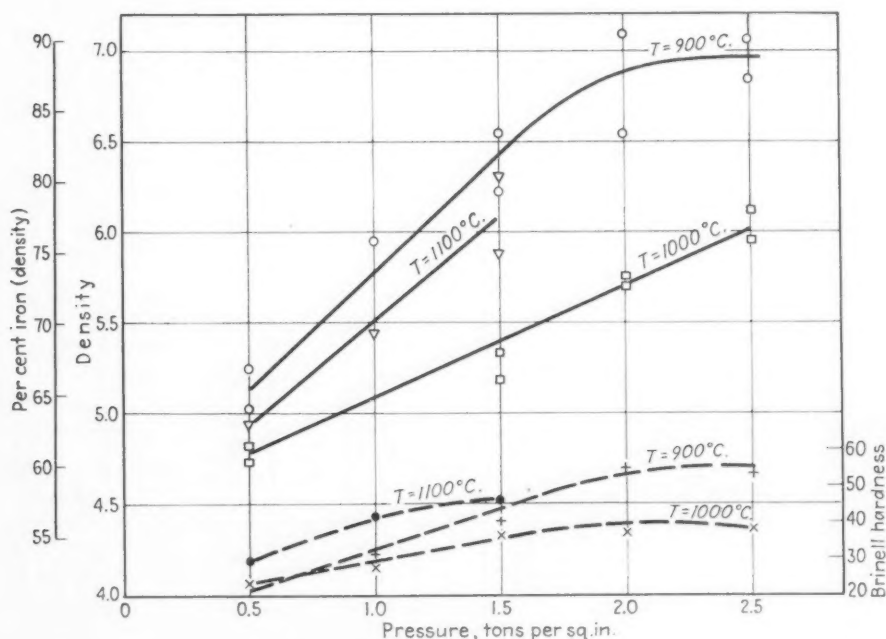


FIG. 7—Density and Brinell hardness vs. pressure; high-temperature hot-pressed Swedish sponge iron powder compacts.

pacts pressed from the two purer iron powders.

The effect of pressure on density and hardness is shown graphically in the diagrams of Figs. 4 to 9. In the low-temperature test series (Figs. 4 to 6) both density and hardness reach peak values at highest pressures used. The curves generally show a hyperbolic trend, and only slight additional improvements in density and hardness appear possible if the pressures were still raised for the different isotherms.

A similar tendency is noticeable for the high-temperature test series (Figs. 7 to 9) although the values, especially for hardness, are considerably lower. In most cases, the density curves are straight lines of positive slope indicating that they constitute only the lower part of the hyperbolic curve, with peak values only to be reached at pressures considerably above 2½ tons per sq. in., which were not attainable with the type of set-up used in this investigation.

Pressure-Temperature Relationship

As already stated the effects of temperature or pressure cannot successfully be evaluated independently. They must be considered in close conjunction to each other. It is quite apparent that for each given press temperature (including room-temperature) there exists a lower pressure limit at which the compact becomes completely dense. While for iron to be pressed at room temperature the necessary compacting pressure may well be in the order of 200 to 300 tons per sq. in., this lower pressure limit rapidly drops with rising molding temperature, especially when plasticity becomes improved above recovery and recrystallization temperature ranges.

Of course, it must be kept in mind that the absolute values will depend much upon the nature, history and properties of the initial iron powder used, but as has become apparent in these experiments, basic plasticity of the powder (as experienced with Swedish sponge iron) does not necessarily yield optimum properties at lowest possible temperatures and pressures.

In Table II a pressure-temperature conversion chart for certain densities is prepared on the basis of these data found. In many cases, experimental values were not available or were impossible to be obtained. As far as possible close

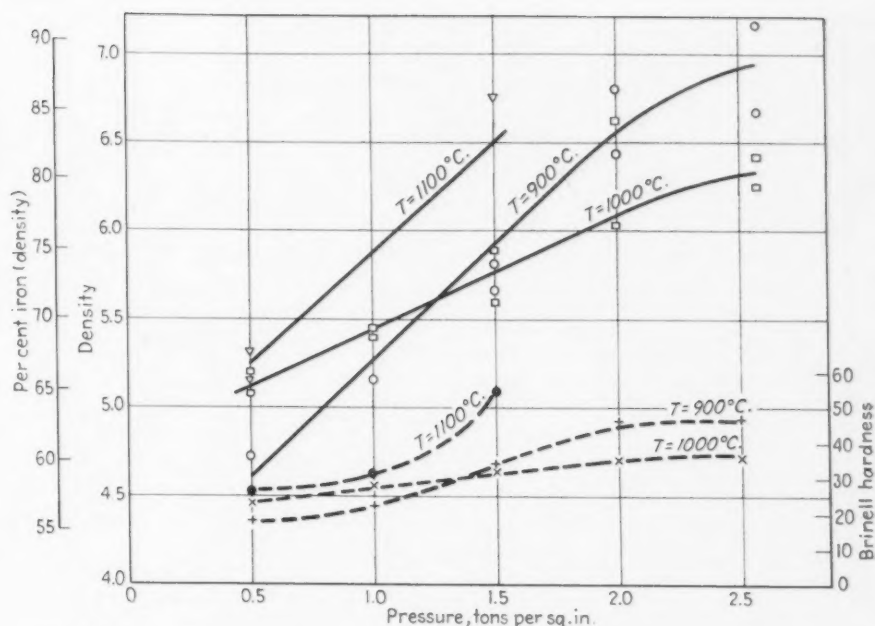


FIG. 8—Density and Brinell hardness vs. pressure; high-temperature hot-pressed electrolytic iron powder compacts.

estimates are indicated in the figures in parenthesis.

The cycle adopted for the hot-pressing experiments was based on experience with other metals, chiefly in the non-ferrous field. In most cases the specimens proved to be rather plastic at the temperature of pressing so that a continuous adjustment of the pressure to its desired value became necessary. The total time for one complete cycle was found to be close to 10 min., if the compact was kept under load for the standard time of 1 min.

Additional tests were made with

different periods of load application. Compacts of the Swedish sponge and hydrogen-reduced iron were kept for 3, 5, and 10 min. at different temperatures (600 deg., 900 deg., and 1000 deg. C.) and pressures (18 and 2 tons per sq. in.).

The extension of the pressing time for the low-temperature test specimens caused greatest increase in density from 94-95 per cent to 98-99 per cent for the 10-min. experiments. In the case of the high-temperature experiments this increase in density due to the exten-

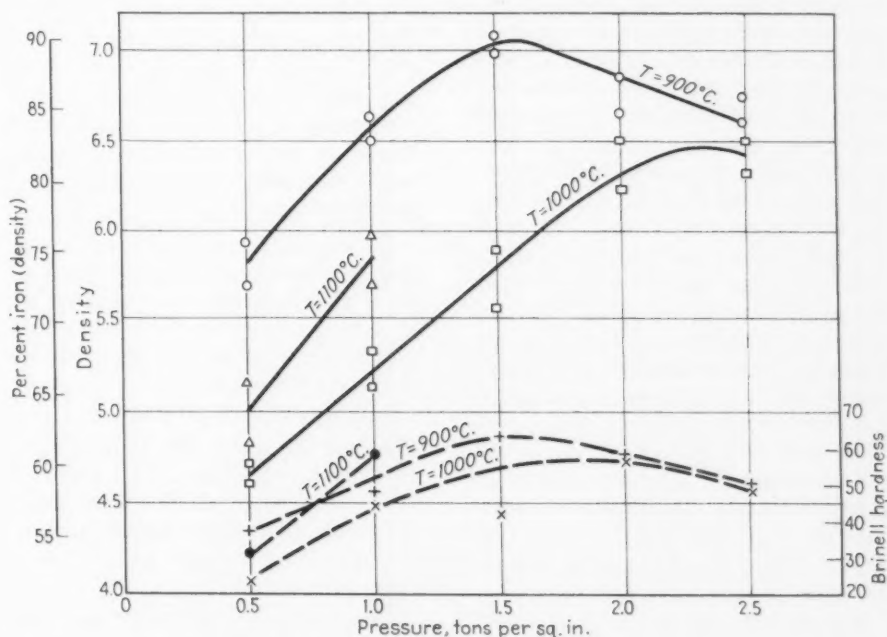


FIG. 9—Density and Brinell hardness vs. pressure; high-temperature hot-pressed hydrogen-reduced iron powder compacts.

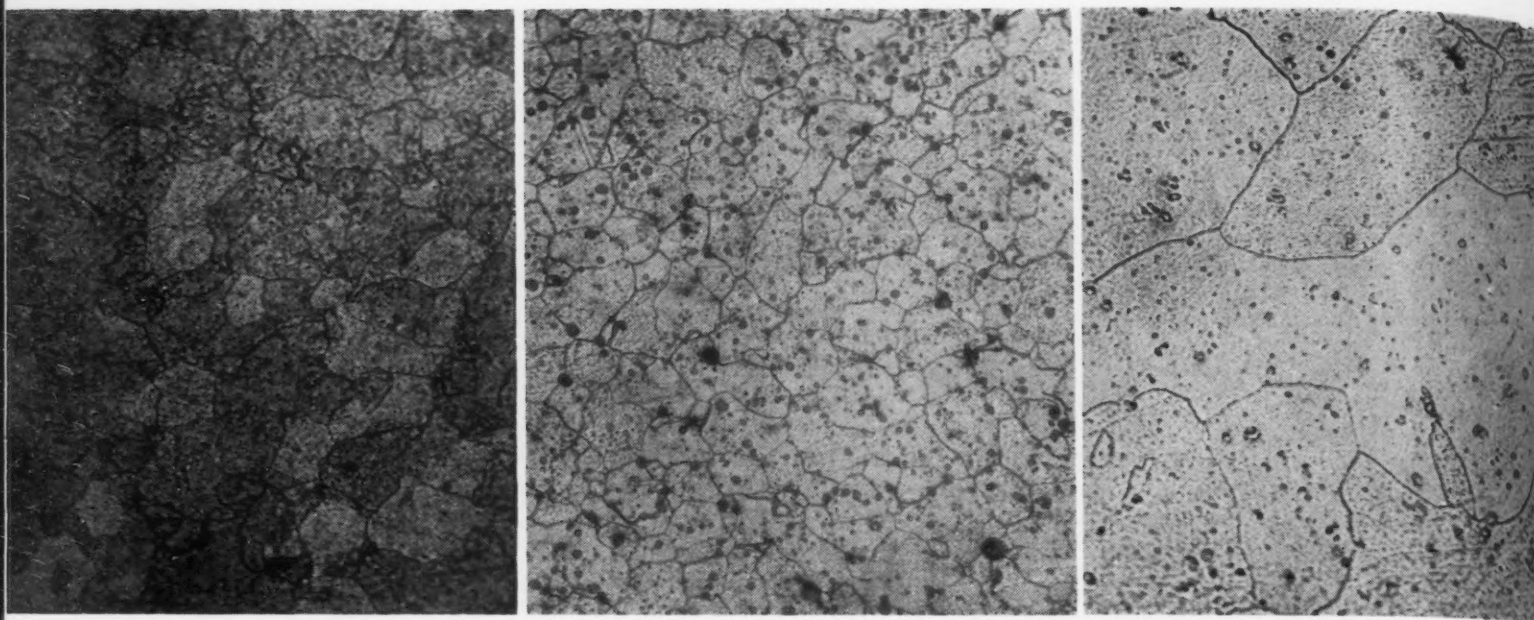


FIG. 10—Photomicrographs of compacts hot-pressed from hydrogen reduced iron powder and subsequently annealed. At 200 diameters. (Left) Hot pressed at 500 deg. C., 50 tons per sq. in., and annealed at 1000 deg. C. for 2 hr.; (center) hot pressed at 500 deg. C., 50 tons per sq. in., and annealed at 1300 deg. C. for 1 hr.; (right) hot-pressed at 900 deg. C., 2½ tons per sq. in., and annealed at 1300 deg. C. for 1 hr.

sion of the press time to 10 min. was considerably larger, varying from 10 to 12 per cent, but in no case did the resulting compacts exceed in density 95 per cent of the ideal value.

Hardness tests made at the same time as the density measurements showed improvements of the same order.

Subsequent Annealing

Annealing treatments of the hot-pressed compacts had most marked effects on the grain structure. As shown in the photomicrographs of Fig. 10, a complete and beneficial change of the structure has taken place during the subsequent heat treatment displaying uniform equiaxed ferritic grains. Grain growth was apparent in the compacts annealed for 2 hr. at 1000 deg. C., but in most specimens annealed at 1300 deg. C. for 1 hr., the formation of large ferritic grains took place, in some cases measuring 200 microns diameter. Besides the change in the grain structure, these subsequent annealing treatments did much to consolidate the structure, to purify and refine the grain boundary areas and to diminish porosity and impurities (oxide films).

The effect of the annealings on the density was only of minor significance. Low-pressed specimens showed improvement after annealing, while higher pressed specimens maintained or slightly de-

creased their density. Compacts annealed at the higher temperature usually showed superior results. In no case did the density variation amount to more than 5 per cent.

Hardness of the low-temperature pressed and, therefore, strained compacts decreased considerably after the annealing treatments, while compacts hot-pressed at the high temperatures maintained or slightly increased their initial hardness.

Conclusion

In conclusion it may be stated that hot-pressing of iron powders may lead to surprising properties if a correct technique is employed.

Pure and fine powders appear to be more suitable and will render superior density, hardness and probably tensile properties.

Both high temperatures and low pressures, as well as low temperatures and high pressures, lead to dense materials, but the latter procedure is more feasible in view of the die problem.

Metallic dies may be used up to 800 deg. C. and permit continuous operating pressures of 10 tons per sq. in. and more which prove to be sufficient to promote complete density of the compacts with an adequate raw material.

Above 800 deg. C. graphite molds may be used, but the permissible pressure drops sharply to 2 to 3 tons per sq. in. Such low pressure

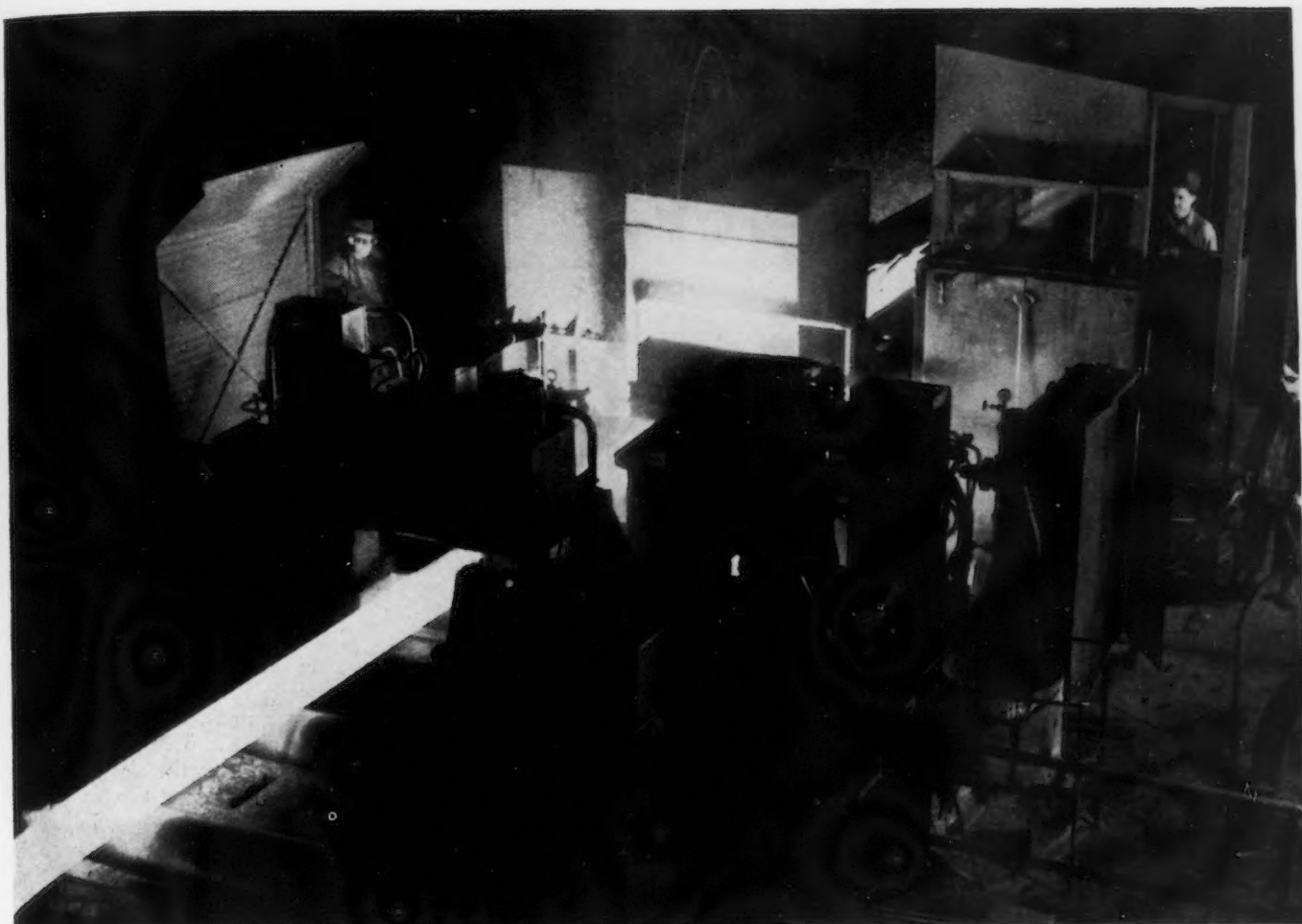
proves to be insufficient to cause complete consolidation, and, even at highest temperatures where partial melting occurs due to the formation of cast iron, the compacts maintain a great deal of porosity.

Density of the hot-pressed compacts may be improved by extending the time during which the load is applied, up to 10 min. However, such procedure would be impractical on account of an extremely low production rate.

High-speed steel as die material proved to be satisfactory up to 700 or 800 deg. C. However, embrittlement of such material at temperatures above 800 deg. C. limits the applicability of the material and suggests the search for other alloys or steels, if temperatures in excess of 700 deg. C. are to be used continually.

The problems of creep, wear and lubrication, will influence the die construction and maintenance to a great extent and consequently will have their effects on the costs and practical applications of hot-pressing of iron.

Subsequent annealing may substitute ordinary sintering proceedings. If carried out under controlled conditions, it contributes greatly to a consolidation of the structure and will produce beneficial effects on the physical properties of hot-pressed iron.



J & L INSTALLS MECHANICAL SCARFER

THE recently installed Lin-de-Surfac machine in the Jones & Laughlin Steel Corp.'s South Side, Pittsburgh works, has been reported as having increased the yield in finished product and decreased the hand-conditioning of the semi-finished product to a appreciable extent.

The flame-scarfing machine is installed in the regular production line of the 44-in., No. 2 Blooming Mill. It is placed after the blooming mill and adjacent to the billet shear where its operation does not interfere with the mill schedule. If desired it can condition the entire blooming mill output or, if only a portion of the output is to be scarfed, the machine can be easily removed from the roll table by electrical control, and an idle roll mounted on the end of the machine's carriage is then drawn into the roll-table line to fill the gap.

The results produced by the Lin-de-Surfac machine, as well as its operation, are being carefully watched by mill engineers with a

By T. C. CAMPBELL
Pittsburgh Editor, The Iron Age

o o o

view toward possible additional installations in other of the Jones & Laughlin Steel Corp.'s plants.

This particular Lin-de-Surfac steel conditioning machine is referred to as a CM-28, and is designed and equipped to remove the surfaces simultaneously from the four sides of blooms at rolling temperatures and at regular mill rolling speeds. The possible depths of removal range from 1/64 in. to 1/8 in. The actual depth to which de-surfacing is done is dependent upon the nature and extent of the defects encountered. (Other operating details on this type of machine appeared in THE IRON AGE, issue of Oct. 13, 1938.

The actual scarfing is accomplished by the application of oxy-acetylene flames as a pre-heating agent and oxygen streams as the metal remover. The preheating and metal-removing gases are applied

through mixing devices and nozzles quite similar to those used for oxy-acetylene cutting and oxy-acetylene hand-deseaming operations. The bloom passes through the center of the machine where it is completely encompassed by four nozzle shoes. These four shoes carry the requisite number of nozzles to give complete coverage to the four sides of the steel section being scarfed.

In the operation of the machine, the bloom passes between these banks of nozzles against the direction of gas flow, and in the passage the surface is removed to the predetermined depth and the bloom passes out of the machine and on to subsequent rolling operations. Its entire original surface has been removed in the form of molten metal and so-called slag. The slag material, which is normally about 80 per cent steel and 20 per cent iron oxide, is reduced to small particles in a slag chute by the application of high-pressure water. It is then carried off and is reclaimable for subsequent recharging in the steel producing furnaces.

Why not more

Die Cast

By T. E. LLOYD
Associate Editor, The Iron Age

Shell Fuse Parts

IN view of the success and economy of the zinc alloy die casting process in Canada, where a second plant is scheduled to go into production on die cast fuse parts in the near future, it is pertinent to ask why the same process is not being followed in United States in the production of fuse parts and other defense parts for our own rearmament. The question appears of special importance for the following reasons:

(1) There is a shortage of screw machining equipment. If die cast fuse parts of the type now being made successfully in Canada were substituted for brass parts, considerable screw machine capacity would be released for other work.

(2) There is a shortage of brass. Demands for brass rod of the type required for fuse parts, forged or made from bar stock, are exceedingly heavy, and this brass released in favor of die castings could be utilized effectively elsewhere.

(3) Lack of defense orders are now closing die casting plants. Die casters, among the most efficient producers of certain types of metal products, could produce many defense items with great efficiency if zinc alloy die castings were approved by the government.

It seems incredible that this highly efficient source of production should be sacrificed. Certainly the zinc required could be made available, and the small amounts of aluminum and magnesium needed as alloying agents for zinc die castings would be justified by the importance of the product and the economies in other directions.

Unfortunately, American die casters have lacked a strong organization to press their case, and only recently have come to realize the need of demonstrating to ordnance and other government authorities the adequacy of zinc alloy die castings for defense parts such as fuses for shells. It should not, in view of the above mentioned considerations, be too late to remedy this situation, especially since the government is so vitally interested in anything which promises to speed and facilitate defense production.

FIVE separate but mating parts for what is known as the percussion type fuse, assembled for and used by the British government, are now being die cast from zinc alloys and finished in large quantities by a Canadian subsidiary of the General Motors Corp. These parts were formerly turned out on

screw machines from brass bar stock by the same company, then working on a small initial order. Substitution of die castings has resulted in marked economies over the former production method, both in respect to total direct labor and in material required.

All of the die castings are in

the zinc alloy known in Canada as Mazak 3, identical to the American alloy Zamak 3, and which, in turn, meets A.S.T.M. and S.A.E. specifications for the alloy that is known in the United States as No. 3 zinc alloy, the most widely used of zinc alloys for die casting. In Canada there is no shortage of zinc, and priorities are not required for its use. The alloy costs considerably less than brass bar stock, machines about as freely, and can be used with practically no waste, as sprues, gates and chips are remelted and recast. Moreover, since the die casting are produced very close to specified size and some surfaces require no machining, cuts are light and machining is done with great rapidity, all of which makes for high economy in production.

Both the casting and machining departments are laid out for rapid and economical production. Machining is done on a line basis, castings being delivered to the starting end and fed along with a minimum of handling until they reach the end of the lines where they undergo rigid inspection and are passed on, some of them on a chain conveyor, to an assembly department. A few of the smaller parts of the fuse assembly are produced chiefly from brass rod, on screw machines, and are not dealt with here.

There are in the casting department of this Canadian plant about a dozen casting machines. Of these machines, the larger ones are of the type in which the metal pot is moved as dies are opened and closed. The smaller machines have



TWO views of each of five fuse parts produced by die casting as they appear in completed form after machining.

fixed metal pots and are of a type formerly used for making odometer parts. These machines, except one, are of the older types, but they were quickly available and were set up for efficient production. All of these machines have air-operated metal plungers capable of producing the heavy injection pressures required.

One machine is the latest type of self-contained die casting machine, equipped with its own pumps for applying hydraulic pressure to the injection plunger and is used with a four-cavity die for producing the body casting of the fuse, which is by far the largest of the five castings made. The die used in this machine is equipped with hydraulic cylinders for automatically pulling side cores and has automatic means of ejecting the gate. Some of the other machines produce the same castings in two-cavity dies, and the remaining machines are employed for producing the four smaller castings required in each fuse assembly. The new machine produces 480 bodies per hr., and the older ones produce 150 per hr. Dies in the older machines are equipped for automatic mechanical pulling of side cores. Gates of body castings are passed, after cooling, directly to punch presses adjacent to the casting machines where the gates are cut from the castings and the flash is trimmed.

The bottom cover, another of the fuse parts, is produced in a four-cavity die on a small machine, at the rate of 125 shots per hr., yielding 500 castings per hr. Although this is a simple part, the die is interesting because it is fitted with threaded cores which are unscrewed automatically by an electric motor attached to the movable half of the

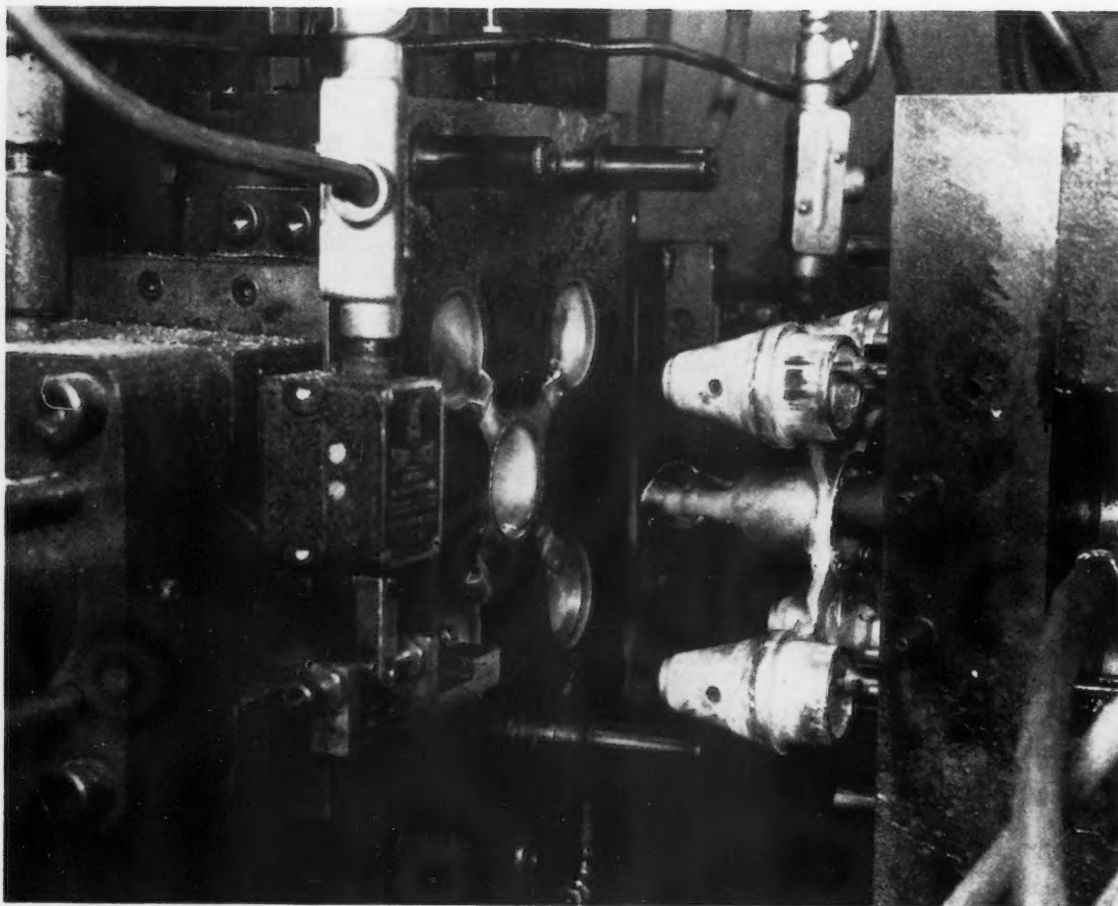
die. The motor switch is set so as to be tripped automatically as the die opens, unscrewing and forcing the castings off the cores.

The fuse magazine is produced in a six-cavity die on one of the larger machines at the rate of 600 pieces per hr. This simple die casting, made in one piece, was formerly made in five separate pieces on the screw machine and then required a milling operation. The fuse shutter, oblong in shape, has two slots, and is made in a four-cavity die on one of the smaller machines at a rate of 750 pieces per hr.

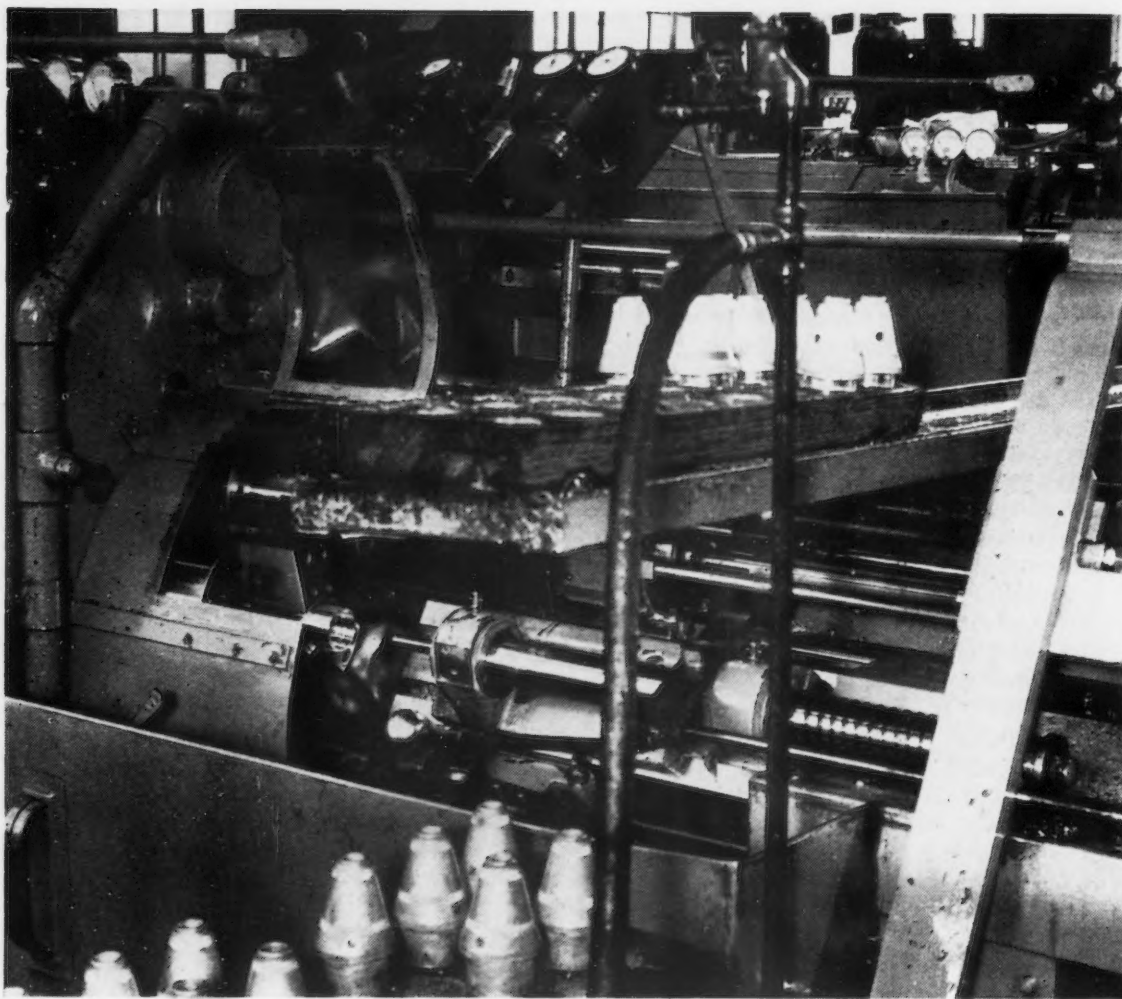
All of the casting machines are set up with the metal pots toward a center aisle with an overhead trolley on which molten metal is brought in ladles from melting furnaces at one end of the shop. This is in accordance with good practice in die casting plants, since it supplies machines with metal at or near the casting temperature and helps to maintain this temperature more nearly constant than if ingots were placed in the melting pot of each machine. Metal pots on the machines are provided with temperature regulators to control the

AT this inspection table at the end of the machining line 40 inspection points are checked by the gages shown. The parts are then hung on the chain conveyor in the background and carried to the cleaning operation preparatory to paint spraying.





THE gate of a four fuse body - casting as it is being ejected from the casting die of the newest machine in the shop. A hydraulic cylinder for pulling side cores can be seen in the left foreground of the picture.



THIS six-spindle chucking machine is set up for machining the inner end of the body casting. The work is in loading position after it has been advanced to this position by a turret loading device. Above the work on the wooden holder are machined parts to be advanced in subsequent operations and the gages over these parts are used to check the machining operations.

fire and maintain the casting temperatures within close limits. On all of the machines the metal injection pressure ranges from 2300 to 2800 lb. per sq. in.

The alloy used in casting is checked with great care to insure that impurities remain below the maximum permitted in the specification. Subsequent to casting and prior to machining, all parts are given a stabilizing treatment during which they are held at a temperature of 200 deg. F. for 6 hr. After cooling in air, the castings are delivered to the machining department in tote boxes on hand trucks.

Machining the Castings

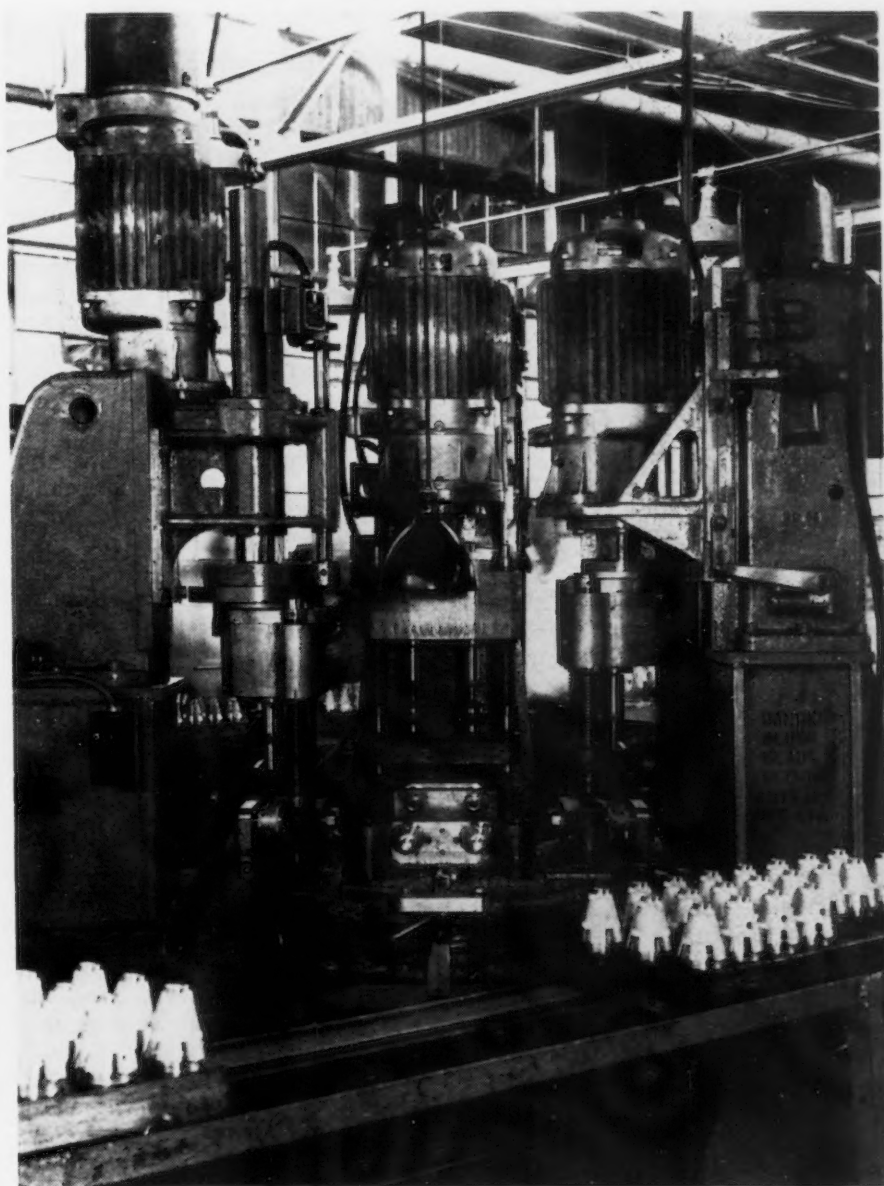
There are three identical lines for machining the body castings and each of these performs all the required machine work and completely inspects 200 castings an hour. The first three operations are performed on drill presses and include reaming the center bolt hole and drilling and tapping a detent hole to receive a plug. As the operations are completed, the castings are passed along a narrow wooden stand which runs the length of the line, although banks of parts in wooden racks are held at some points to take up slack and avoid delays if the rates of various operations do not precisely keep apace with each other.

At the fourth station on the line there is a six-spindle chucking machine, arranged for hand loading from a sliding fixture on the turret. Wherever feasible in this machine, as well as in other operations, carbide cutting tools are employed because they permit rapid machining with a minimum of down time for setting and sharpening tools. Operations on the chucking machine are all automatic, except for loading, and include boring and threading the central hole; boring, undercutting and threading the magazine hole; turning, undercutting and threading the outer diameter at the end; and facing the shoulder. All necessary gages for checking these operations are provided at the machine and operators must gage completely each 24th piece.

It is not possible to finish the inner end of the body casting in the chucking machine operations just described, hence the piece is passed to another chucking machine of the four-spindle type to do this job. Operations included on this machine are: finishing and undercutting striker cover recess; turning,

undercutting and threading for the nose cap; facing the shoulder to length; chamfering top edge; and turning tapered diameter concentric. After this machining, the bodies are washed, blown out and marked with a stamp on the tapered diameter. Next, the swivel detent

dles with tools for duplicate operations, and each station a suitable holding fixture. Two body castings are loaded at a time and indexed. The work is then brought automatically and successively under tools which, respectively, turn, undercut and tap the centrifugal bolt



SHOWN here is the vertical machine on which successive boring and tapping operations are performed at three stations on the indexing table. The fourth station, in the foreground, is where the parts are loaded and unloaded.

hole in the large bore is reamed and the spanner hole burr is removed. A hand punch is then used to coin the top edge of the nose hole to avoid any sharp burrs at this point.

Castings are next transferred to a special vertical machine having a central indexing table with a loading and three work stations, each of the latter having two spin-

hole and drill and tap the retaining screw hole. In the next two operations the threads in the magazine and detonator holes are rechased. If required, the outside threads are also rechased and the detonator hole is retapped.

This completes the machine work on the bodies and they are passed to an inspection bench where six

girls use plug, snap, thread, indicator and other gages to check a total of 40 dimensions. Some of these dimensions must be checked on every body and some are checked on only 10 per cent of the bodies. Parts failing to pass inspection of any detail are returned to the required station to correct the fault when feasible or are scrapped and remelted. Inspection also includes visual examination to see that no porosity is in evidence at any significant point. Checks against porosity are also made by weighing castings before and after machining. This, however, is not done at the inspection bench at the end of the line just described. Fuse bodies that pass inspection are hung individually on wire racks on a chain conveyor and are carried to booths where they are automatically spray painted.

Finishing Fuse Magazines

The castings termed magazines are machined in two duplicate lines entirely separate from those just described, each line capable of producing 300 pieces per hr. On these lines the first operations are done on a four-spindle automatic chucking machine, loaded by hand. On this machine both diameters are turned, the smaller is undercut, and both are threaded. Next, the magazines are shifted to a drill press for drilling a small hole, the bottom of which must be square. At the end of this hole the wall must be held within thickness limits of 0.008 to 0.015 in. A special drill, made from a drill rod ground to semi-circular section at the end and provided with a carbide tip, is used to bore this hole. Another tool is used to "break" an inner corner, and another similar corner is struck with a coining tool, operated by a piston in a small air cylinder. This tool is in the form of a stepped punch to insure that the corner is square and without any burrs. The small central hole, called the flash hole, is then carefully inspected to make sure that there is no evidence of porosity. A small brass pin is then forced into a cored hole by a small air-operated press to provide a pivot for a retaining spring. The final machining operation on this piece is to hand ream a small cored hole on the shoulder of the piece.

Inspection of the completed magazine includes the use of five dial indicating, four snap and two height gages, and a gage for measuring the thickness of the

wall at the end of the square bottom hole. This measurement is made with a dial gage mounted on a ram operated by a rack and pinion, the gage having an extension which is lowered into the hole. Parts which pass inspection are hung on the same chain conveyor used to carry body castings to the spray booths.

Finishing Nose Caps

Die cast nose caps are finished on a single line equipped to handle 600 pieces an hr. and are delivered to this line while still on the casting gate. The first operation is done on a drill press, using a special combination tool with two carbide cutters. One of these cutters faces the cap to length and, at the end of the cut, the other tool turns through the thin flash and gate, cutting the nose cap free from the gate. At the end of the cut an air nozzle is tripped, blows off chips and ejects the piece into a chute through which it slides to the next machine, where the cap is tapped. Next a small cross hole is drilled for a rivet and, in the final operation, a small leaf spring is riveted to the cap by a riveting machine.

One of the two remaining die cast parts, the shutter, is machined on a line equipped to handle 1200 pieces per hr. These die castings are received on a gate containing four castings and the first operation is to shear the four castings simultaneously from the gate in a small punch press, the die used being made to cut the flash around the entire periphery but not from the two slots at one end. Then the two longer edges of the oblong piece are held, manually, against a sanding belt to remove any "whiskers" left by the trim die and to smooth the edges. The castings are then inserted, one at a time, into a coining die in a light punch press. The die is designed to fit all four edges and two faces of the shutter, and the coining blow tends to expand the shutter slightly, trueing all faces.

In the following operation, the shutter castings are placed, one at a time, in a slide moved by hand and fed forward on a table against a stop. In making this stroke, two small circular saws on the arbor of the small milling machine employed in this operation, saw the flash cleanly from the two cast slots, leaving no burrs. A spring ejector throws the piece out on the return stroke of the slide, the operation

being performed with great rapidity. The pieces fall into a chute which carries them to a drill press where a hole is drilled in them. The hole edge is struck by an air-operated coining die to make certain that it is sharp and free of burrs. Each piece is then checked with five gages and is ready for transfer to the assembly department.

Only some very simple operations are needed to finish the final piece, the bottom cap, which is the one cast with an internal thread from which the core is unscrewed in removal from the casting die. This piece is cast with a straight knurl on its outside diameter. The only machining needed is to cut the piece from its gate, face the end and turn a bevel at the edge of the knurl, operations which are quickly performed in a drill press setup. The cap is then sent along for painting.

Prior to spray painting, the body and magazine castings are passed through a degreaser that employs trichlorethylene as the cleaning agent. Nose caps, bottom covers and shutters are run through another degreaser, being handled in pans. As soon as the parts issue from the degreasers they are dry and ready for spraying with an orange lacquer which gives them the appearance of being brass, except on some surfaces which are not sprayed.

Painting the Fuse Parts

Spraying is done on continuous conveyors which pass through spray units equipped with automatic guns set to spray only as the work is passing and is rotated in front of them. Threads and other surfaces which make a close fit or on which a finish might interfere with proper functioning of the fuse, such as the flash hole and the center bolt hole, are automatically masked so that no lacquer is deposited on them. The lacquer used is a fast drying type and the parts are ready for assembly soon after spraying.

From the foregoing description it is evident that the entire production system is well conceived and correspondingly well operated. It is believed to be one of the most efficient systems of fuse production now in existence, primarily because it involves the use of die castings which are sound and yet turned out at a rapid rate, and, secondly, because the subsequent machining operations are rapid and highly efficient.

Austenite Grain Size

—Concluding last week's article explaining the effects, manipulations, and limitations of austenitic grain size.

EFFECT of Austenite Grain Size on the Toughness of Steels at High Hardness: Probably the most obvious relationship is that between grain size and toughness at relatively high hardness. Every user or hardener of tools early learns to associate a coarse grained, sugary fracture with poor service. Using the notched bar test as a measure of toughness, Bain¹⁰ shows the relationship between austenite grain size and charpy impact in ft.-lb. at a constant hardness of 50 Rockwell C by means of a diagram reproduced here as Fig. 8.

Scott²⁰ states that wholly granular impact fractures corresponding to minimum impact resistance were obtained in coarse grained steels at hardness values over 400 Vickers (41 Rockwell C) but not in fine grained steels up to 600 Vickers (53 Rockwell C). Stagg¹⁸ showed the effect of grain size on Izod unnotched specimens of tool steel broken in impact by means of a diagram reproduced as Fig. 9. From these and general information gathered from experience the desirability of providing a fine austenite grain when using steels hardened over 50 Rockwell C is obvious and since most tools and carburized parts are used in this range, for such parts a fine grained austenite in the final heat treatment should be provided.

As indicated previously, within certain limits this fine austenite

might be produced by restricting the final heat treating temperature to the very minimum, which

will provide full hardening, but this means very accurate temperature control. Also, for carburized parts, unless the steel will keep its fine grain at the temperature required to provide the depth of carbon penetration desired in a reasonable time, it would be necessary to provide one or more additional reheats to obtain the desired fine grain in the case. From the standpoint of quality, the relative desirability of box quenching over box cooling with single or double reheats is debatable and depends upon many factors, such as the amount and distribution of free cementite or austenite at the surface, the hardness of the core, the amount of allowable distortion, and even whether or not selective hardening by the mechanical removal of part of the carburized case is to be practiced.

However, in the present emergency, the potential bottlenecks to maximum production offered by heat treating equipment in many plants makes the use of box quenching almost a necessity.

The ability of the mills to produce fine grained carburizing steels within the limits described above probably represents one of the most

By **ARTHUR E. FOCKE**
Research Metallurgist, Diamond Chain & Mfg. Co., Indianapolis

o o o

outstanding developments since World War I.

Effect of Austenite Grain Size on Toughness of Medium

Carbon Steels: The medium carbon heat treating grades of steel as used for machine parts are commonly quenched and tempered to below 45 Rockwell C, in fact, perhaps 350 Brinell (36 Rockwell C) would represent a fair upper hardness limit, and below this range there is no definite information to indicate that the austenite grain size is significant from the standpoint of toughness.

With such steels used in the normalized state, there is an indirect relationship between toughness as indicated by the notched bar test and the size of the austenite grain. Herty²⁰ has shown that in these pearlitic hypoeutectoid steels, the impact resistance is lowered as the amount of free ferrite is increased and since the amount of free ferrite with any particular analysis and cooling rate is increased as the austenite grain size is reduced, finer austenite grain size indirectly causes lower impact strength.

Effect of Grain Size on Strength and Hardness of Normalized Medium Carbon Steels: Of equal, and in some cases greater, importance is the lowering of the strength and hardness caused by the increased amounts of free ferrite in normal-

ized medium carbon steels as the austenite is made finer grained. For example, in small ASA roller chains, it is the practice of Diamond Chain to use for sidelinks a 0.50 C steel which is air cooled from above the critical in the strip before the final cold finishing. This finishing stock should run over 155,000 lb. per sq. in., and with the coarse grain steels originally available this "patenting" produced a structure in which the ferrite was present only as very thin envelopes. With the present trend toward emphasis on fine austenite grain, it is becoming impossible to obtain the coarse grain material, and the modern fine austenite grained steels precipitate out so much more ferrite with the same treatment, that it is difficult, if not impossible, to obtain the required minimum tensile. It is now necessary to increase the alloy content or raise the heat treating temperature sufficiently to reduce the amount of ferrite separation and both these methods of correction introduce processing difficulties.

Effect of Austenite Grain Size on Hardenability: This reduction in the hardness of normalized fine austenite grained steels introduces, naturally, the whole subject of the effect of austenite grain size on hardenability. Hardenability is a term that is confusing because it is used to include two concepts: first, the ability of the steel to attain a high surface hardness and, second, the ability of the steel to transform completely without forming fine pearlite at relatively slow rates of cooling.

Separating these two concepts, the ability of the material to reach various surface hardnesses when quenched at a fast enough rate to prevent direct fine pearlite transformation, but slowly enough to keep the amount of retained austenite to a minimum, is a function of the carbon content and independent of the austenite grain size.

However, coarse austenite grains transform to fine pearlite more slowly than fine austenite grains and it is possible that with the same size pieces quenched in the same way, if this cooling rate at the surface would be just fast enough to prevent the transformation to fine pearlite in a steel with a coarse austenite grain size and therefore give a maximum surface hardness for the carbon content, this cooling rate would not have been fast enough for the same steel

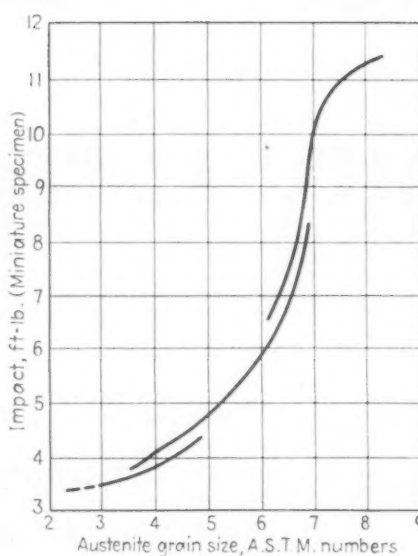


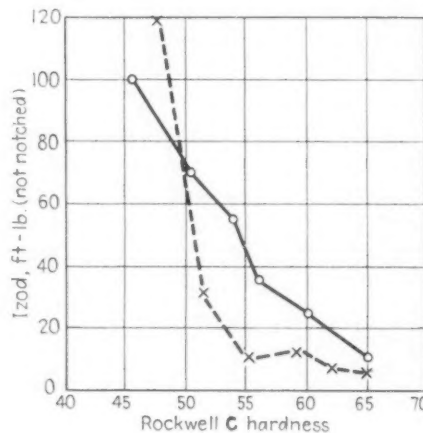
FIG. 8—Effect of austenite grain size on the toughness of eutectoid steel heat treated to 50 Rockwell C. (After Bain.)

o o o

treated to produce a fine austenite grain size, and soft spots would result. Conversely, it might happen that if the cooling rate used were fast enough to have prevented transformation to fine pearlite in the fine austenite grains, a similar piece of the same material treated to produce a coarse austenite would transform to martensite so slowly that relatively large amounts of austenite would be retained and therefore the surface hardness

o o o

FIG. 9—Effect of austenite grain size on the toughness of oil hardening tool steel. (After Stagg.)



might be lower than that of the fine grained steel sample similarly treated.

Aside from the surface hardness, it is frequently necessary to be concerned with hardening a part completely throughout its cross-section, or at least providing sufficient depth of hardened zone to support the applied load.

Since the rate of cooling decreased rapidly as the distance below the surface increased, it is clear that with any particular analysis the depth of hardening will be dependent upon the critical cooling rate of the material and therefore at least partially on the austenite grain size.

Digges²¹ determined the relationship between grain size and the critical cooling rates for pure iron-carbon alloy and his results are given in Fig. 10.

Grossmann²² studied the effect of grain size on hardenability using the concept of the ideal critical size, that is, the diameter of the piece which will just harden completely throughout its cross-section when cooled in a quench with an infinitely fast cooling rate. His data are compiled in Fig. 11, and they show that the depth of hardening increased faster with increasing austenite grain size in those steels in which the tendency for deep hardening because of the chemical analysis is greater.

Effect of Austenite Grain Size on Machinability: Part of the difficulty in providing quantitative data on the effect of austenite grain size on machinability arises from the fact that there is no simple measuring stick for this quality. About all that can be said then is that for rough machining a coarse austenite grain size may be very much superior to a smaller size, so much so in fact, that the simple expedient of raising the normalizing temperature only 100 deg. F. may make the difference between a satisfactory operation and one which is almost impossible from a production standpoint.

On the other hand, for special work requiring a high surface finish, the steel with the coarsened austenite grain size may not be so satisfactory as that which is finer.

Effect of Austenite Grain Size on Rate of Carbon Penetration: In Table I the writer recorded the commonly accepted idea that fine austenite grained steels carburized more slowly than coarse grained.

The question marks indicate that this idea may not be actually true. Mehl²³ showed by careful studies that the rate of carbon diffusion in steel was constant over a range of austenite grain sizes from A.S.T.M. —3 to A.S.T.M. 8.

The writer's attempts to associate the depth of case with the austenite grain size using the common method of measuring case depth resulted in many contradictions. It seems possible that the common tendency to ascribe reduced rates of carbon penetration to fine grained steels may be explained in part by the use of the common methods of case depth measurement as an indication of this penetration.

The fracture, the macroetch, and the hardness on a tapered cut methods are all influenced by hardenability which is admittedly lower for fine grained steels and a microscopic measurement of the slowly cooled case may tend to show a shallower depth measured to a point of equal ferrite and pearlite percentages because of the known tendency for fine austenite grain to permit ferrite separation more readily.

Effect of Austenite Grain Size on Fatigue Resistance: With all the many factors which do seem to affect the fatigue resistance of steel, it is consoling to learn from a recent summary on this subject²⁴ that "grain size, which is extremely important in respect to the ability of a notched steel specimen to resist impact, seems of relatively minor importance in fatigue."

Conclusions

To conclude, the writer is frequently called upon to consider the problem of austenite grain size, both from the standpoint of preparing specifications and from the other side in meeting specifications often prepared by others. Consciously, or otherwise, the following general rules seem to have developed for carburizing or medium carbon steel grades for machinery applications:

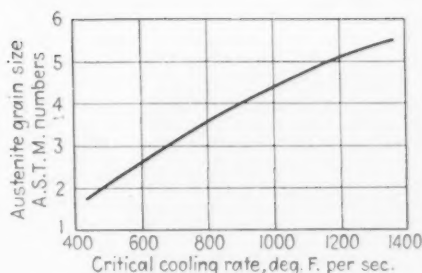


FIG. 10—Relation of critical cooling rate to austenite grain size of iron-carbon alloys with 0.85 per cent C. (After Digges.)

(1) Don't specify an austenite grain size without carefully considering whether or not enough information is available to indicate that a particular size is necessary or desirable.

(2) If, after considering all the problems of fabrication, treatment and application, an austenite grain size restriction seems necessary, make the restriction as liberal as possible and never closer than three numbers at either end of the A.S.T.M. series, omitting intermediate ranges of 4 to 6.

(3) In most cases, assume that this austenite grain size will be tested on billet samples by the McQuaid-Ehn test at 1700 deg. F.

(4) For special purposes, it may be desirable to specify that the austenite grain size be tested at some other temperature or by some other method and for these cases or for critical parts or materials in which it seems necessary to restrict the austenite grain size on the finished article, the same methods of specifying the size described in (2) should be applied, but the exact method of making the test should be included.

(5) Acceptance tests on material specified with a restricted austenite grain size should be tested by the McQuaid-Ehn method at 1700 deg. unless the specification explicitly

states that some other method be employed. The grain structure should be considered to be satisfactory if 70 per cent is within the specified grain size limits.

(6) If the austenite grain size determined by the McQuaid-Ehn acceptance test is not as specified and is different from that determined by the mill on the billets, run a sample through the regular processing which the material or part will be given in production to determine whether the observed differences on the McQuaid-Ehn test will be significant. If the final grain size after the standard processing is not as expected, in normal times it might be desirable to reject the material. However, in the present emergency, it would probably be better to attempt to correct the final austenite grain size by using one or more of the various manipulations described above.

(7) Similarly, while in normal times a plant might not accept a heat in which the billet grain size was not as specified, in the present emergency it might be desirable to attempt to develop the correct austenite grain size by varying the treatment.

(8) Obviously, if the specification requires that the austenite grain size be determined by some method other than the McQuaid-Ehn test, then the acceptance test should be made in the manner specified and if the results are not within the specifications, it is again possible that one or more of the manipulations described above will produce the desired results.

References

¹⁰ "Functions of the Alloying Elements in Steel," by Bain, A.S.M., 1939, p. 55.

²⁰ "Effect of Deoxidation on Grain Size and Grain Growth in Plain Carbon Steels," by Herty, et al., Co-op Bulletin No. 65, Carnegie Institute of Technology and Mining and Metallurgy Advisory Board, 1934 (The Physical Chemistry of Steel Making).

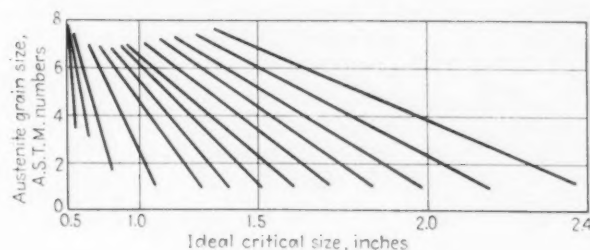
²¹ "Influence of Austenitic Grain Size on the Critical Cooling Rate of High Purity Iron-Carbon Alloys," by Digges, Transactions A.S.M., vol. 29, p. 285.

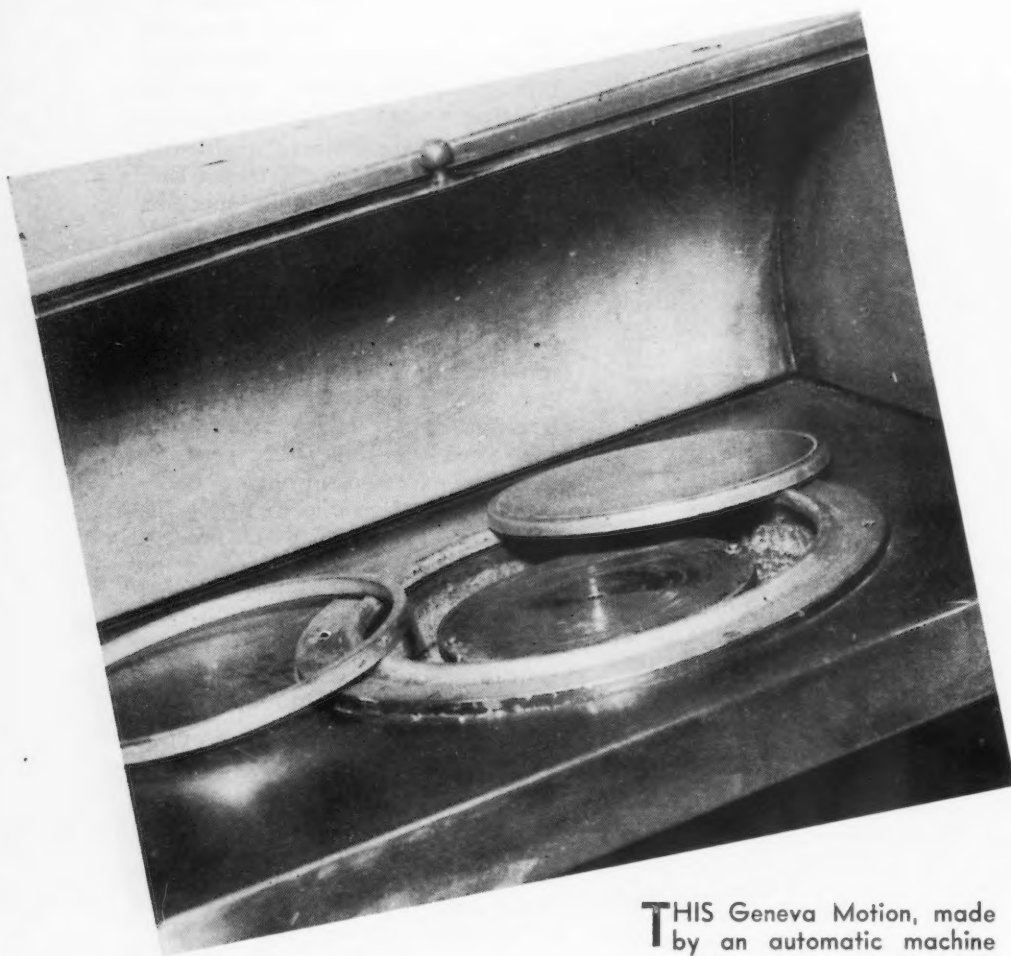
²² "The Effect of Grain Size on Hardenability," by Grossmann and Stephenson, Transactions A.S.M., vol. 29, p. 1.

²³ "Rate of Diffusion of Carbon in Austenite," by Wells and Mehl, Transactions A.I.M.E., 1940, p. 292.

²⁴ "Prevention of Failure of Metals Under Repeated Stress," Battelle Memorial Institute, 1941.

FIG. 11—Effect of austenite grain size on hardenability. (After Grossmann.)





Pre-Heat

o o o

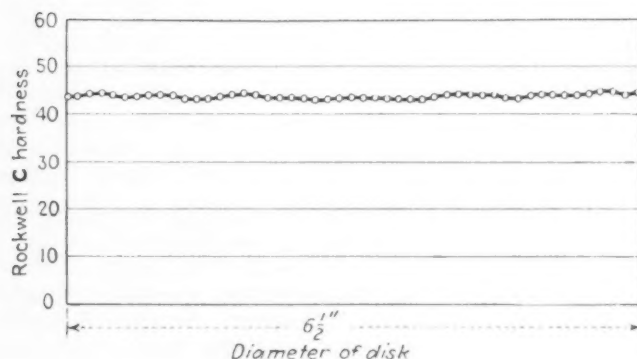
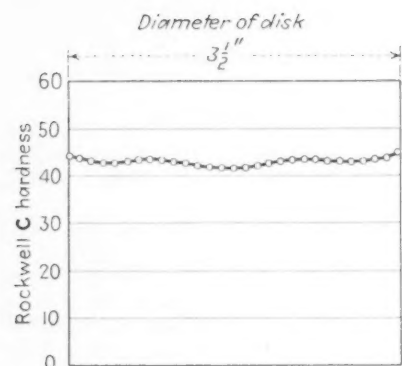
ELASTUF "44", a new pre-heat treated alloy steel of a chrome - nickel - molybdenum type, has been developed by the Horace T. Potts Co., Philadelphia, to meet a growing demand for steels that need not be heat treated after they are machined, but are of such a nature that machining can be done after heat treating. It is claimed that "44" has uniform cross-sectional hardness and uniform tensile properties in all sizes, high impact strength in relation to its tensile strength, and practical machinability and uniformity from heat to heat.

Having a wide range of experience in the development of pre-heat treated alloy steels in the lower hardness ranges, the Horace T. Potts Co., set for their goal a steel somewhere in the 300 to 350 Brinell hardness range. Elastuf "44", named from its Rockwell C hardness, is the result of this research.

As illustrated in the accompanying drawing, the new pre-heat treated steel has uniform cross-sectional hardness in all sizes. The hardness varies only slightly from 44 Rockwell C in both the 3½ in. and 6½ in. disk, this uniformity making for better machining at maximum speeds.

THIS Geneva Motion, made by an automatic machine manufacturer, was formerly made of SAE 1112 steel, requiring 22 hr. to completely machine. Carburizing, hardening, grinding and lapping followed the machining, and a large percentage of the parts were scrapped because of distortion. It takes 28 hr. to completely machine the part from Elastuf "44" and nothing further need be done, as it was pre-hardened and finishes in good condition.

o o o



THIS diagram shows the uniformity of the cross-sectional hardness of heat treated 3½-in. and 6-in. round bars.

TABLE II

Izod Impact Values for Elastuf "44"

Size	Longitudinal Transverse	
	Ft. Lbs.	Ft. Lbs.
1½ in. Round	21-23	4
3½ in. Round	19-20	4
6 in. Round	18-18	5

Treated Alloy Steel

The tensile properties, according to Table I, remain fairly constant in all sizes, tensile strength ranging from 193,000 lb. per sq. in. on the 4½ in. round to 212,500 lb. per sq. in. on the 3 in. round, and the average being just slightly higher than that of the 6-in. round. Other properties associated with tensile strength likewise indicate high uniformity. Longitudinal and transverse Izod impact tests were made on Elastuf "44" and the results are shown in Table II. Here, as in tensile tests, uniformity is high on the tests made at midway points on the sizes indicated.

While it has been customary to have high ductility in pre-heat treated steels in preference to high tensile strength, Horace T. Potts Co. indicates that practical experience along these lines show that where the design of a part is good, high tensile and low ductility steels can be safely and satisfactorily used under severe conditions. Elongations and reduction of area figures in Elastuf "44" have been kept as high as possible, although the exact danger point on these properties has never been exactly determined.



THIS "torpedo" is used on injection molding machines and must stand great pressures with considerable heat and abrasion. When made of Elastuf "44," the machining was very efficient, and the finish was fine enough that chrome-plating was unnecessary to get the required abrasion resistance and smooth flowing.

TABLE I
Tensile Properties of Elastuf "44"

Bar Size	1½ in. Round	2 in. Round	2½ in. Round	3 in. Round
Tensile Strength, lb. per sq. in.	209,000	209,000	212,000	212,500
Yield Point, lb.	185,000	199,000	200,000	199,000
Per Cent of Elongation in 2 in.	13	12	12.5	12
Per Cent Reduction of Area	45.4	44.3	43.4	42.8
Brinell	415	415	415	415
Rockwell C	43	42	44	44
Bar Size	3½ in. Round	4½ in. Round	5 in. Round	6 in. Round
Tensile Strength, lb. per sq. in.	208,000	193,000	199,000	204,000
Yield Point, lb.	191,000	175,000	184,000	198,000
Per Cent of Elongation in 2 in.	13	12.5	12	13
Per Cent Reduction of Area	44	43.5	43.4	42.8
Brinell	415	401	415	415
Rockwell C	44	41	44	44

Etching Technique

By M. G. CORSON

Metallurgical Consultant, New York

—A continuation of the discussion in the Aug. 14 and Aug. 21 issues on the theory of etching, and application of neutral ferric chloride solutions to the etching of nickel alloys. Also, various "strange structures" are described in detail.

Permanent and non-permanent solid solutions—Among copper alloys that are of practical use are found two distinct structures. The alpha solid solution corresponds to the ferrite in iron except that the first is face-centered cubic, and the second body-centered. And the beta solid solution which corresponds to austenite except that the first is body-centered cubic, while austenite is face-centered. And, of course, there is always a range of duplex structures—alpha plus beta.

Both structures can be either stable or capable of a dissociation. The permanency can be established either micrographically, radiographically (absence of symptoms of dissociation) or physically (a perfect continuity of characteristics as functions of temperature, time and composition).

Using the micrographic test alone brings the assumption of permanency for a large number of solid solutions. Any sample of annealed 30 per cent brass, 5 per cent tin bronze, 5 per cent aluminum bronze, all cupro-nickels and industrially used cupro-mangans, exhibit no trace of dissociation, and neither

can it be found in a 46 per cent zinc beta brass.

Radiographic methods (X-rays) go somewhat further in general, but even they would discern no sign of discontinuity in the alloys just mentioned. On the other hand, physical methods almost cannot be used without detecting an anomaly or discontinuity. Leaving alone the finer points consider those cases in alpha type alloys that show a most definite lack of permanency. These are the alloys in which the concentration of the added elements grows with the temperature, permitting the alloy to be soft-quenched and heat-aged into high hardness and strength. The following list shows the alpha alloy combinations which possess that feature of instability leading in most cases to the capacity for heat-hardening.

Binary alloys—Copper-beryllium, copper-titanium, copper-chromium, copper-cobalt, copper-germanium and copper-indium. Also copper silicon with the difference that here the phase that forms on dissociation has a different crystalline habitus and can not be used as an efficient hardener.

Ternary alloys — Copper alloys with silicon plus the proper amount of chromium, manganese, cobalt or nickel. Copper alloys with beryllium

plus any of the same four metals. Copper alloys with phosphorus plus nickel, and probably with cobalt or chromium as well. Copper-alloys with aluminum plus the proper amount of nickel or manganese.

Quaternary alloys—Same alloys containing larger amounts of zinc or aluminum or silver, the latter acting as an accelerator of precipitation.

From the industrial viewpoint all these alloys can be subdivided into three groups:

(1) Those where the maximum hardness oscillates around 100 Brinell and the strength around 60,000 lb. per sq. in. (without cold work). Here belong copper-chromium, copper-chromium-beryllium, copper-chromium-silicon, and copper-chromium-phosphorus; also, copper-cobalt, copper-nickel-phosphorus, 5 per cent copper-silicon.

(2) Those where maximum hardness oscillates around 200 Brinell, and maximum strength around 120,000 lb. per sq. in. (without cold work). This group embraces practically all other alloys listed, except:

(3) Copper-beryllium, which with 400 Brinell maximum and 180,000 lb. per sq. in. maximum strength forms the third group. This third group of copper alloys

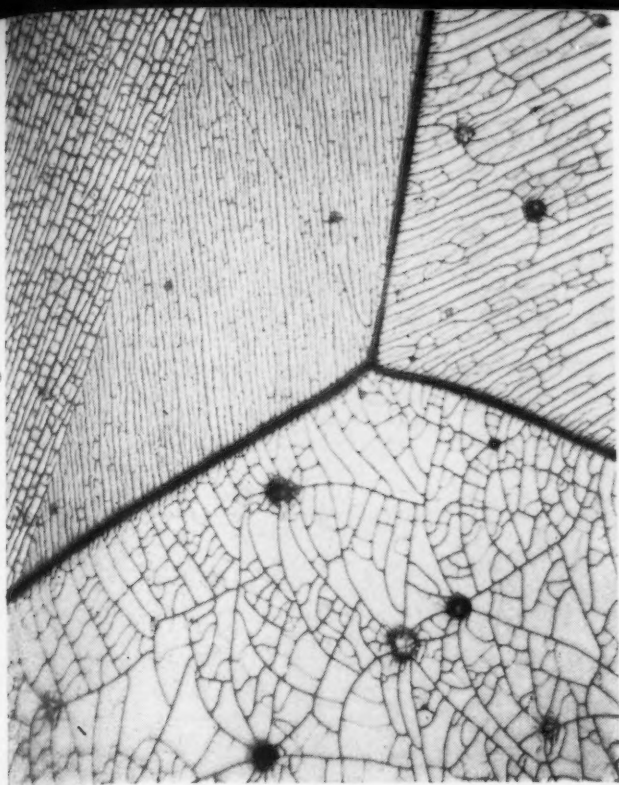


FIG. 21—Precipitation lines in a wrought and over-aged alloy of copper with 1.05 per cent Be. Two of the grains are plain, one twinned. The lines extend from one grain to another but always change their directions when crossing. Sharp changes can be seen in the twinned part of the grain to the left. At 500 diameters.

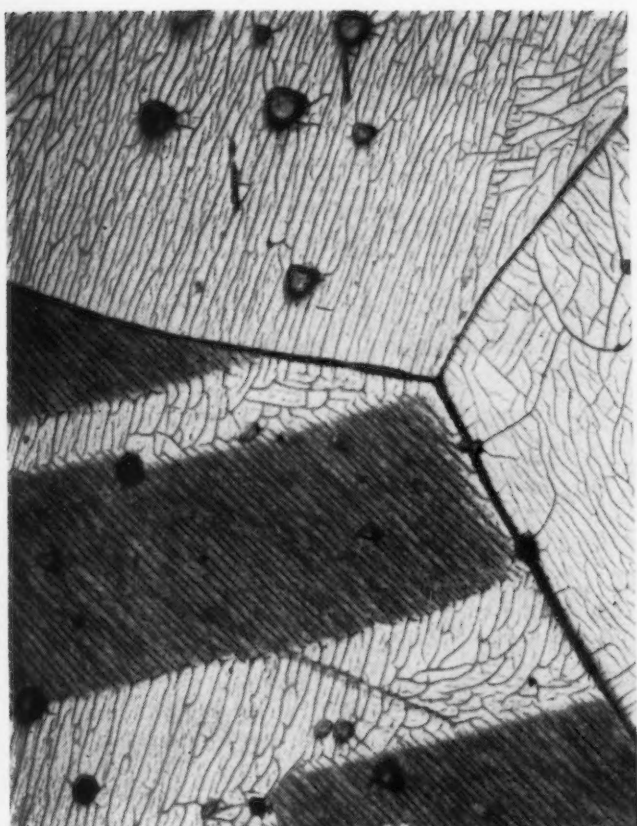


FIG. 23—Same alloy as in Fig. 22. A spot showing two plain and one twice twinned grain. Also beta grainlets. At 500 diameters.

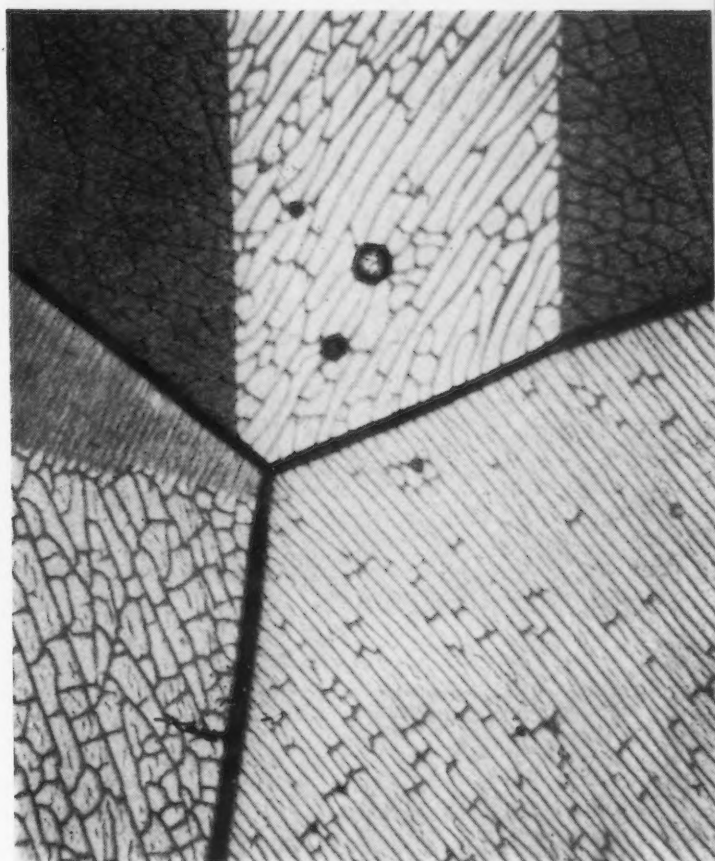
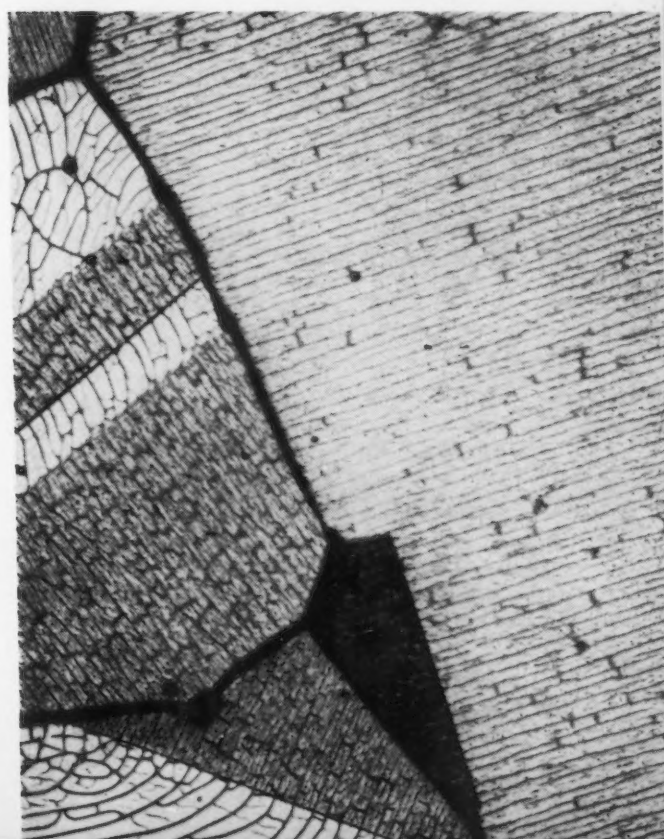
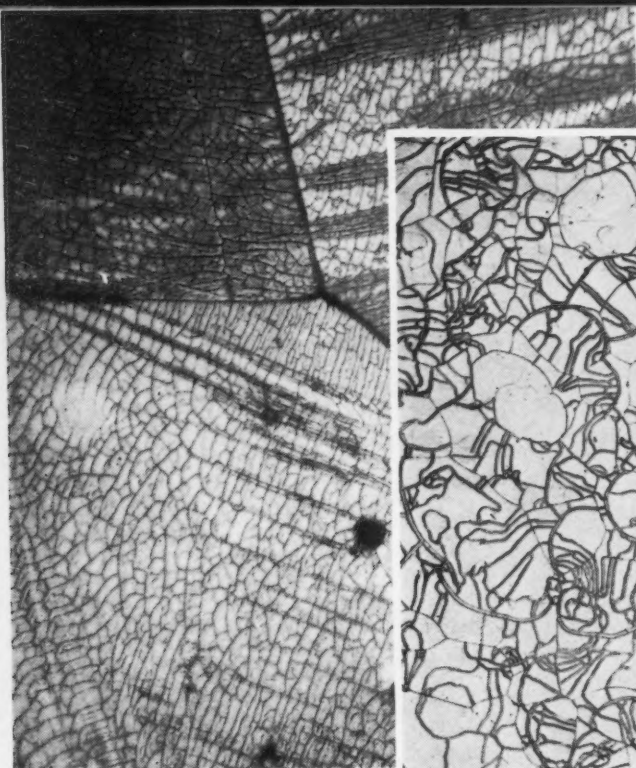


FIG. 22—Same alloy as in Fig. 21. Shows the veining in two twinned and one plain grain. At 500 diameters.

o o o

FIG. 24—Same alloy as in Fig. 23. One very large non-twinned grain and two twinned ones. At 500 diameters.





ABOVE

FIG. 25—Same alloy as in Fig. 24. A spot showing a grain with multiple twinning. The dark areas carry dense striations all running in the same direction. In the bright areas the striae run almost perpendicularly and are less dense.

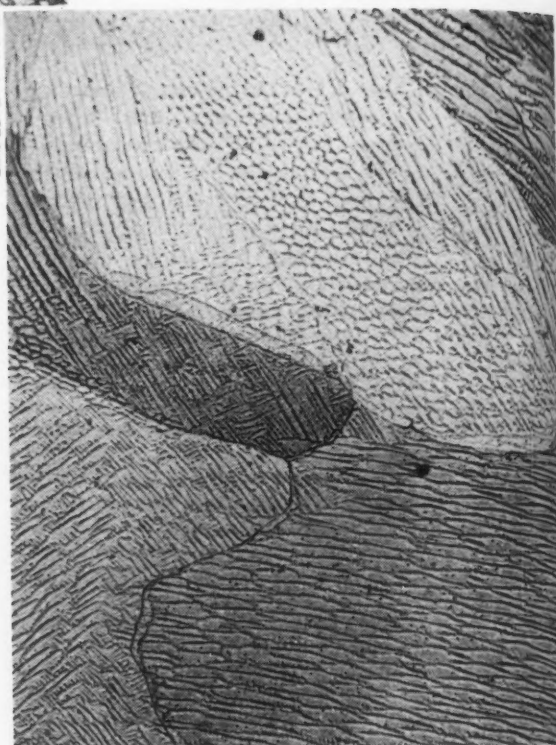


o o o

LEFT

FIG. 26—Veining in a hot rolled alloy of copper with 4 per cent nickel and 1 per cent Si. Quenched from 900 deg. C. At 500 diameters.

o o o



RIGHT

FIG. 28—Veining in a cast alloy of copper with 3 per cent cobalt. At 100 diameters.

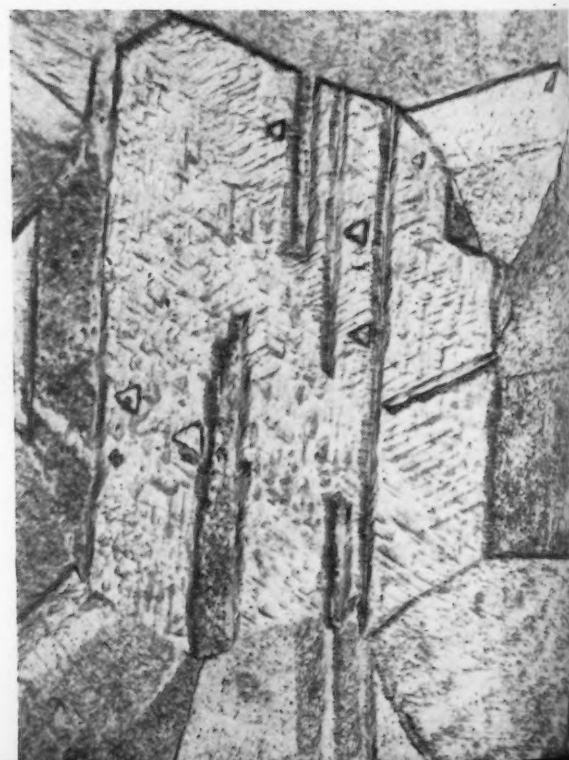
o o o



FIG. 27—Veining in a hot rolled alloy of copper with 8 per cent nickel and 4 per cent aluminum. At 100 diameters.

RIGHT

FIG. 29—Twenty per cent zinc brass, rolled, annealed at 850 deg. C. and deep etched. No veining visible. At 500 diameters.



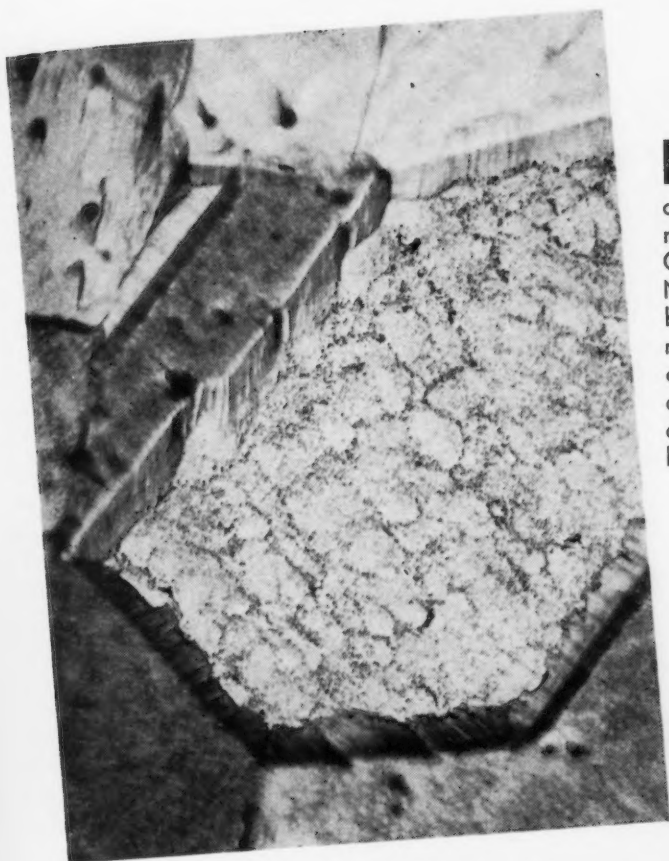


FIG. 30 — Zinc brass (34 per cent), rolled and annealed at 800 deg. C. Deep etched. No true veining visible, although some might be present on account of not completely dissolved secondary beta. At 500 diameters.

will be discussed here in connection with "strange structures."

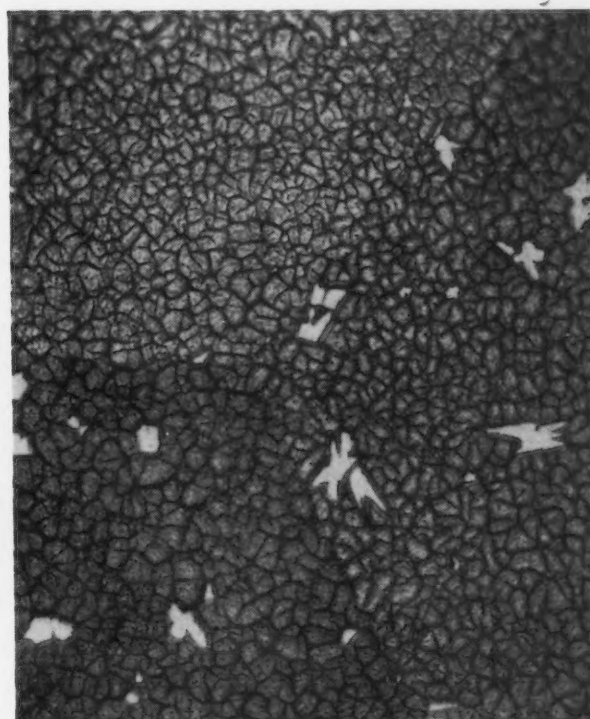
The question of the alpha phase boundary has been investigated many times and today there is available a diagram which is quite definite on this subject (Fig. 12). However, it will be worth while examining the methods used in determining the alpha boundary in this and other cases.

The first method is micrographical. The experimental compositions are annealed for a long time at the chosen temperatures and then quenched. If the microscope does not detect the presence of the grainlets of the second phase, the particular point of composition/temperature is in the alpha range.

The second method is by X-ray analysis. The parametra of the crystalline lattice of the quenched sample are examined; if they do not change anymore by quenching from a higher temperature the particular point is in the alpha range.

The third method is by hardening tests. If the sample does not acquire an additional hardness if quenched from a higher temperature before the hardening treatment, the lowest quenching temper-

FIG. 31—A high tensile manganese bronze, at 500 diameters. Three grains, each carrying grainlets of the iron constituent and a network, which only ammonium persulphate brings to light.



ature at which a given hardening is obtainable lies near or on the alpha boundary.

Finally, there is the electrical resistivity method. If the resistivity of the sample does not increase anymore with an increase in the quenching temperature, the point lies in the alpha range.

Actually, the situation is far more complicated. The microscope may not detect undissolved particles whose size is less than 0.0001 mm. and does not account for segregations, which are merely brushed

aside. The three other methods do not account for spontaneous precipitations which take place even in quenching and, besides, the last units of the secondary element that go into solid solution usually affect the parametra, hardness, and resistivity to a much smaller extent than the first units. All this is mentioned in order that the position of the alpha boundary line given in any diagram should not be accepted as 100 per cent perfect no matter what authority is behind the investigation.

The accepted point of maximum solubility is 2.1 per cent beryllium at 864 deg. C. The industrial alloys run from 2.0 per cent to 2.5 per cent Be. With 2.5 per cent Be the

alloy always contains a considerable amount of beta grainlets all over.

But, even with 2.0 per cent Be a complete solubilization is not obtainable. An alloy of this composition may have 2.1 per cent Be at the surface and 1.9 per cent at the core. The inverse segregation always takes place. With proper cold work and anneal the surface layers will appear as a homogenous alpha. But the core will carry stringers of beta in spite of the lower Be content. These defy any attempt to obtain a complete homogenization. Only

when the Be content (average) drops to 1.85 per cent can a complete homogenization be achieved. This at the cost of less than 15 units Brinell and 8000 lb. tensile strength (172,000 lb. per sq. in. against 180,000 lb. without cold work before hardening).

Wrought alloys containing that much Be (above 1.8 per cent) usually develop a comparatively small grain. Quenched from about 800 deg. C. and etched with any of the reagents available they show nothing except clean grains of alpha with a remaining grainlet of beta here and there. In other words they exhibit no strange structures.

However, consider a piece of sand cast alloy homogenized at 800 deg. C. and hardened at 400 deg. C. or somewhat above the maximum

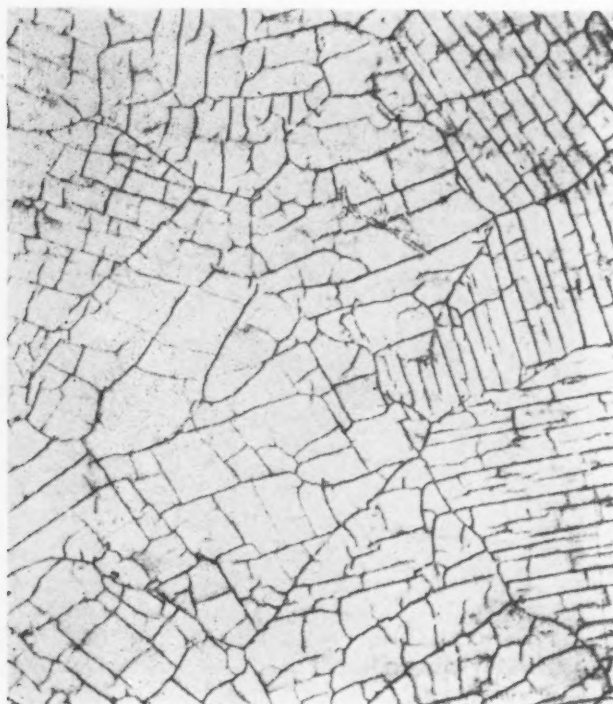


FIG. 32—An alloy of copper with 35 per cent antimony. Chill cast, annealed at 600 deg. C. and water quenched. Each grain of former beta phase carries a distinct veining exactly like that in the 1.05 per cent Cu-Be. At 500 diameters.

hardening temperature. Then etch it with an ammoniacal solution ammonium persulfate, in which the acting substance is the ion SO_4 . The result will be a structure shown in Figs. 13 and 14. A most extraordinary structure to say the least. A mere etching effect? Of course a mere etching effect, but so is every grain boundary in ferrite or alpha brass. None of them exists in reality and each is brought out simply because the strained interfaces corrode easier than the inside of the individual grain.

Then apply the same reagent to a sample taken from a chill cast ingot (Fig. 15) of the same composition. The undissolved secondary beta may be seen; and the dendritic mass of alpha may be seen as should be the case with every alpha solid solution. And, also seen are, the black areas where a precipitate spontaneously formed on cooling, without growing to directly visible particles, caused an excessive etching attack. But there is no network of any kind.

A sample of the same alloy hot

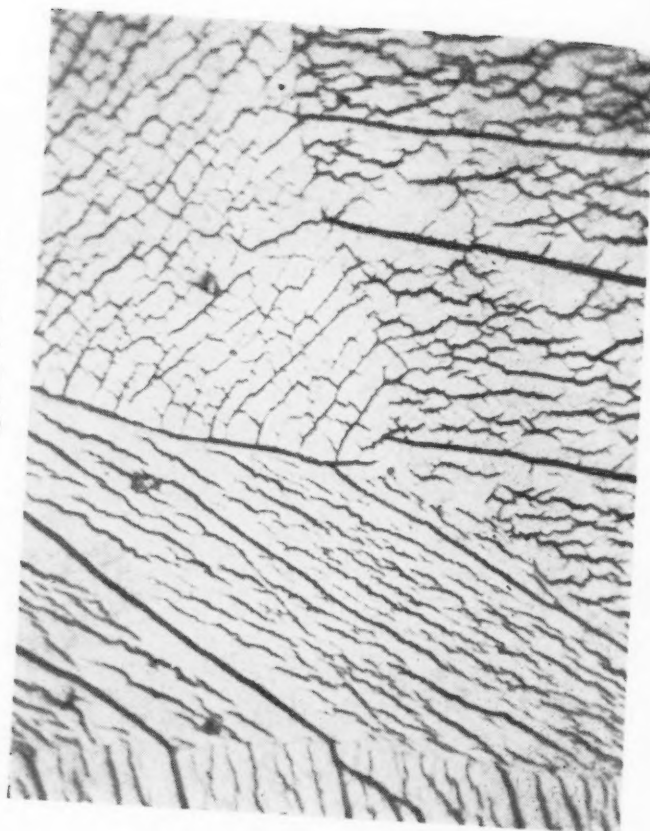


FIG. 33—Same alloy as in Fig. 32, as chill cast. The original beta grains carry a heavy network indicating spontaneous precipitation. At 1500 diameters.

forged and hot rolled from 4-in. sq. ingot to 1 in. round and quenched from 800 deg. C. shows no strange structures, as already stated. It does not show them even as hardened or slightly over-aged. Even when aged at 650 deg. C. in order to coalesce the precipitate it shows nothing strange and unusual (Figs. 16 to 18). However, one point must be stressed in this case. In spite of the absence of cold work effects, the coalesced particles of the precipitated phase possess definite directions and seem to be formed by a process of coalescence and necking-in of much finer chains. Those who read the article on the strength of steel in *THE IRON AGE*, June 20, 1940, might remember the concept advanced of hardening filaments passing through the whole grain and even from one grain into another like reinforcing steel rods through concrete. The rod-like particles shown here in straight stringers are in the author's opinion the results of the breakdown of such hardening filaments.

When the Be content is considerably below 2 per cent, for instance 1.6 per cent, it becomes impossible to obtain a picture of the coalescing precipitate, at least if the over-aging is done for not over 24 hr. The

reason is clear—the amount precipitated at 600 deg. or 650 deg. C. is too small to grow into visible particles, while at 400 deg. to 500 deg. C. the speed of migration of beryllium atoms through the lattice of the alloy is too low. This is a very important point: For if the secondary phase of beryllium copper-alloys cannot grow to visible sizes when precipitated from a solution in the softer copper phase, how can it be assumed that iron carbide would spontaneously form visible plates when precipitated from a much harder iron phase at a mere 700 deg. C.? This is one of the most important points against the present day theory of the meaning of pearlite.

Now take a sample of a chill cast ingot containing only 1.05 Be. Etched with ammonium persulfate it yields structures shown in Figs. 19 and 20 at 100 and 500 diameters respectively. There are still a few undissolved grainlets of beta, and there are the usual dendrites. There is also the spontaneously formed precipitate. But right among it is found a network of very fine wavy lines. This is a strange structure indeed, no matter whether it is called "veining," "etching effects," etc.

What are these lines? Of course they are not representing a new phase, nor are they the author's "hardening filaments." Those filaments *need not* have a thickness of over 20 to 30 interatomic distances and therefore *are not* thicker, consequently cannot be seen under a microscope. But their presence gives birth to an increased etching attack and so are formed first the fine lines, then the uniformly wide furrows, etc.

Now the ingots may be hot worked to get again a round rod 1 in. in diameter. This is quenched from 900 deg. C. to obtain quite large grains. The samples are etched again with ammonium persulfate. This yields the array of pictures shown in Figs. 21 to 25.

It may be seen that the veins have definite directions and less definite ramifications in each individual grain. Also, it may be seen that they have a tendency to pass from one grain into another, and always abruptly change directions when so doing. Note also that the twin bands differ from the mother

grain as far as the directions of the veins go.

Etching effects? Yes, just etching effects that form on account of something invisible being present under the surface of the sample, something intimately connected with the presence of a precipitated phase or a precipitable component.

To prove that requires no great study. Ammonium persulfate produces the same type of veining in all copper-base alphas that are subject to precipitation hardening. Figs. 26 to 28 show this in Cu-Ni-Si, in a Cu-Ni-Al alloy (with 4 Ni and 1 Si and 8 Ni and 4 Al), and in a cast alloy with 3 per cent cobalt. A still finer and less dense veining is obtainable when the alloy does not carry such high amounts of the hardening elements.

On the other hand, no such veining can be produced in brasses with either 20 or 34 per cent zinc (Figs. 29 and 30.) Here the samples were quite deeply etched and no veining appeared. Neither is it possible to obtain the veining in cupro-nickels and alpha aluminum bronzes.

True enough, the veining cannot be obtained in Cu-Be alloys or others mentioned when a solution of $\text{FeCl}_3 + \text{HCl}$, or $\text{CrO}_3 + \text{HCl}$, or ammoniacal H_2O_2 , is used as the etchant. These reagents etch violently and a rapid etch produces "polyhedra," while a prolonged etch results in a pitted blurr.

The reason is simple. In ammonium persulfate there is a heavy slow ion, SO_4^{2-} . It can act only where distinct chemical or mechanical discontinuities are present at considerable distances one from another. In other reagents there is the light and mobile ions Cl^- or OH^- which penetrate easily and yield either a uniform dark or a uniform bright field, which tricks the observer into believing that he sees actual polyhedra.

In the beta field—Of the beta copper base alloys it is known that most of them dissociate easily into a mixture of alpha plus some of the higher phases, be they called gamma, delta, epsilon, etc. Only beta brasses are assumed (on the basis of certain ideas) to remain stable, except for secondary changes like that of the lattice parameter.

From the beta brasses are derived the high strength brasses which contain lesser amounts of

zinc but considerable amounts of aluminum plus some iron and manganese. These brasses may possess a ductility of 35 per cent elongation in 2 in. which is accepted as a sign that they, too, do not dissociate; or else like beta aluminum bronzes or beta tin bronzes they might not possess even 1 per cent elongation.

So far these manganese bronzes were etched either by chromic acid or ferric chloride reagents always containing some HCl (or NaCl plus H_2SO_4 which amounts to the same). So etched they show an alternation of dark and bright grains of uniform shade, through the individual grain.

The picture becomes quite different when the alloy is etched with persulfate. It exhibits no more dark and bright grains. In fact the shades are so indefinite that the grain boundaries cannot be distinctly seen. On the other hand it shows (Fig. 31) again a specific type of network differently oriented in each individual grain and sharply distinct from the iron bearing bright constituent appearing mostly as primary grainlets inside the beta grains.

An analogous network can be seen in a beta alloy of the copper-antimony series. Whether quenched or slowly cooled it develops a precipitate that leads to the formation of veins as shown in Figs. 32 and 33.

What etchant to choose for copper alloys?—In the light of the foregoing it seems clear that if structural details are to be studied the persulfate solution must be given preference. The reason is again that this choice rests upon the logical use of a reaction in which a valency change takes place, the SO_4^{2-} ion changing to SO_3^{2-} at a comparatively slow speed and producing sulphates which are soluble in ammonia. However, too much fine detail obtainable plus lack of ability to dissolve disturbed metal, etc., combine to produce usually a section where the individual grains are not very distinct, where the field is too flat.

If the desire is to merely obtain beautiful pictures with distinct polyhedral grains, with twin bands sharply defined, it is necessary to take recourse to the older reagents which act due to presence of the ions of chlorine or HO^- .

Permanent Mold Castings

PRODUCTION of 160-lb. cast iron sewer rings and manholes at the rate of one casting every 15 min. per machine in permanent mold machines of unusually simple design is being successfully done by the Wagner Permanent Mold Co., Burbank, Cal. This patented machine is largely a modification of the unit described in *THE IRON AGE*, June 2, 1938, p. 48.

The specifications for the sewer rings, which are set in the ground, are such that the natural, unmachined surface of the metal after cleaning is adequate for the use to which the rings are put, eliminating the need of a cope. The unit's drag section is permanently affixed to a foundation, while the core section can be raised and lowered to release the casting by means of a hydraulic hoist.

The joint between the two mold sections has a clearance of 0.002 in. which is adequate to prevent penetration of molten metal into the joint. Both sections are of semi-steel construction, with the core section hollowed out to eliminate weight and to aid in cooling.

Before casting, the mold sections are heated to about 300 deg. F. and coated with a refractory material. After pouring (see Fig. 1 for gate construction), the metal is allowed to cool for a definite length of time, then the core section is lowered and the casting removed.

This cooling period is critical and must be followed closely to prevent cracks due to contraction of the casting over the core during solidification. After each pour, the mold is coated with refractory material, but no other treatment is required. Risers are not used.

Cooling of the molds is accomplished by circulating oil by gravity through the cooling chambers

(see Fig. 2) which encircle both core and drag. After passing through a mold section, the cooling oil drains into a cooling basin, from which it is pumped to a tank above the mold. It is then fed back to the molds by gravity. A control valve placed in the return line regulates the volume of oil passing through the cooling chambers and in this manner makes possible

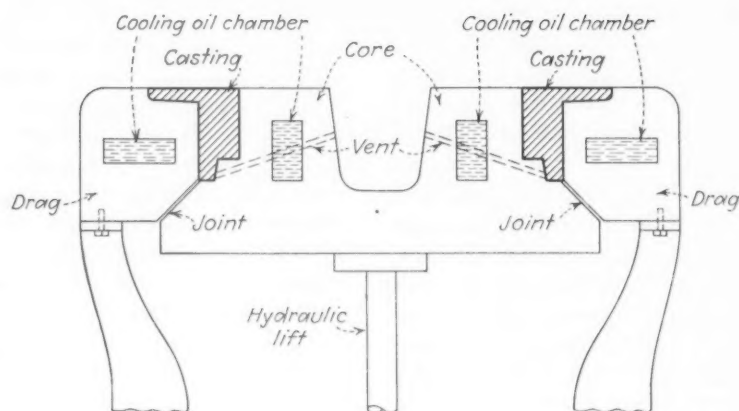
maintenance of a steady temperature of the molds.

The machine illustrated here was designed primarily to cast sewer rings weighing 160 lb. and measuring 2 ft. 6 in. in diameter. Other units of similar design, however, are being used to cast aluminum parts weighing up to 54 lb. Aluminum is poured at 1350 deg. F. and iron at 2500 deg.

RIGHT
FIG. 1—Permanent mold machine, showing removal of casting.

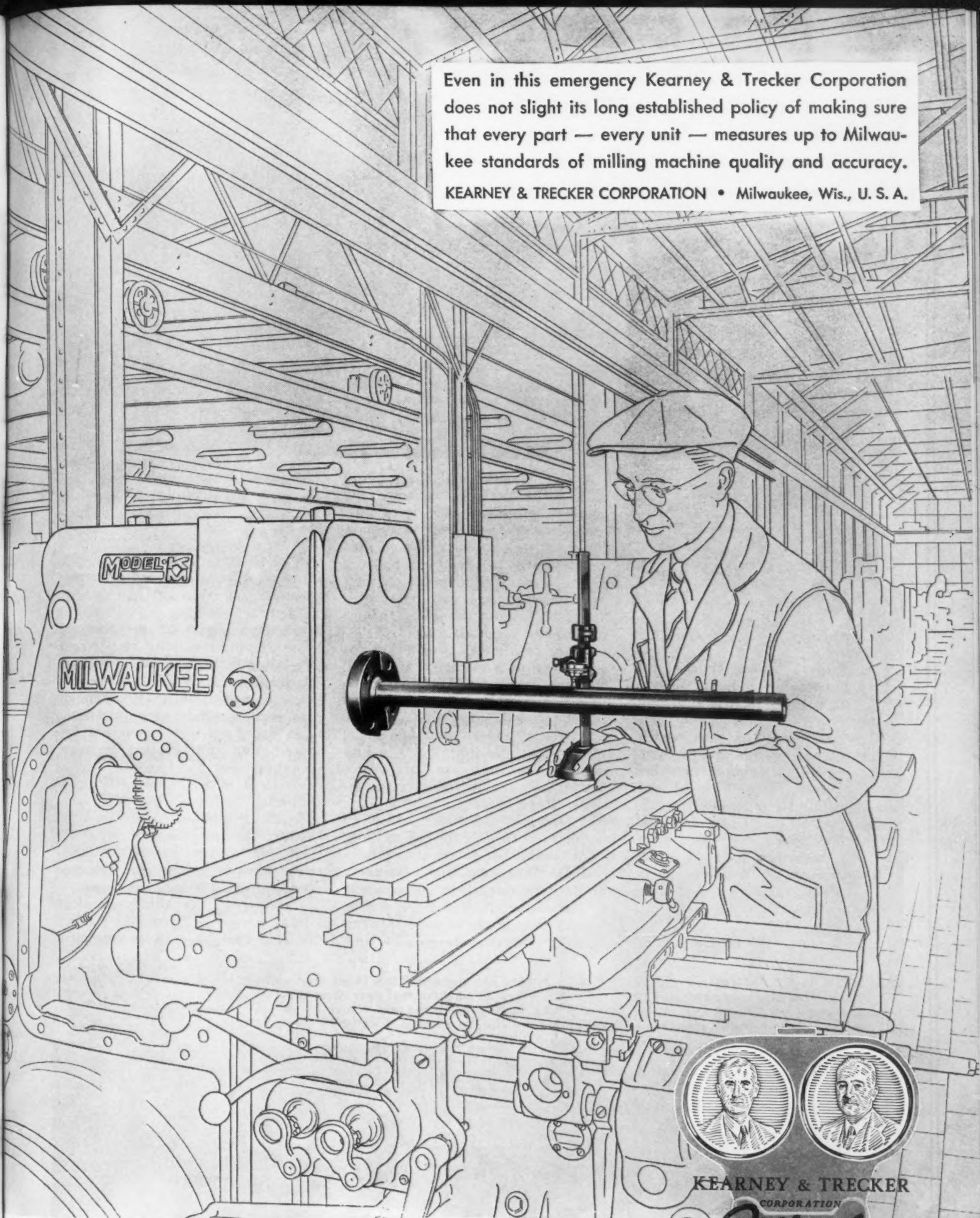


BELOW
FIG. 2—Construction features of the Wagner permanent mold machine for casting 160-lb. sewer rings.



Even in this emergency Kearney & Trecker Corporation does not slight its long established policy of making sure that every part — every unit — measures up to Milwaukee standards of milling machine quality and accuracy.

KEARNEY & TRECKER CORPORATION • Milwaukee, Wis., U. S. A.



INSPECTION TO DETERMINE SPINDLE RUNOUT.



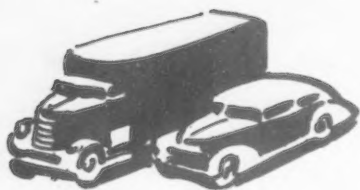
KEARNEY & TRECKER
CORPORATION



Milwaukee MILLING MACHINES

Assembly Line

• New cars carry more bright metal than ever before although material can't be purchased after Oct. 1 . . . Aluminum drive a farce with old metal still in piles built in local collections.



DETROIT—Even though the automobile industry knows definitely now that all bright metal will disappear from cars within a few months, new models being introduced this month carry more glittering bumpers, grilles and moldings than those of any previous year. It is definitely established that no additional material of this sort will be purchased after Oct. 1, although manufacturers who have bright metal parts in stock at that time will be permitted to use them until the stock is all gone.

This flying in the face of known

facts—and making extensive use of a material which cannot be continued on later models—can be attributed principally to the competitive spirit in the industry and to the determination of the industry's sales departments to offer customers a line of cars that would not suffer in comparison with 1941 models. This seems to overlook the fact that the buying public was mentally conditioned to take cars without bright metal trim because of the great deal of pre-selling of this idea that the industry's own salesmen did during the latter months of the 1941 season.

AS it is, automobiles are going to be stripped of trim and gadgets, piece by piece, until they get down to the barest essentials. The industry probably would quit making cars before it offered any for sale without fenders, but it is certain that cars will be offered for sale without many of today's supposedly essential gadgets.

Since new model production got underway in a majority of plants, the industry has had a fair sample of the materials delivery situation which it will face this fall. A Chrysler executive mentioned the other night the difficulty of selling cars "without hub caps." He wasn't joking, because the industry has already faced shortages of just such an item and has had to hold up batches of cars until the missing item could be obtained and installed. There was a similar delay at Packard recently when a supply of speedometers failed to arrive. Finally they began to come through from the supplier—a few at a time

by air express. And Packard met every plane at the airport to get its allotment so the assembly line could be kept moving.

Part of the explanation for this type of delay is that it is a penalty for the usual high efficiency of automobile companies and their suppliers. In the past, the industry has found it possible to get shipments with such clock-like regularity that it was deemed unnecessary to stock many parts such as these alongside the assembly line. They just came in by the truckload for a few hours or a few days production requirements. Now that suppliers have unexpected loads imposed by defense demands, and because of inability to buy raw materials, the situation becomes serious.

QUEER indeed are the workings of priorities and other restrictions. One automobile manufacturer reports an instance in which a supplier of an aluminum part cut shipments by 40 per cent, explaining that he had been informed of OPM-OPACS restrictions on use of secondary aluminum for such non-defense requirements and had been told to cut his former output. Fortunately the motor manufacturer had two suppliers on this item, in accordance with longstanding practice. The other supplier hadn't heard of any such an order, so he simply upped his schedule to take care of the shortage. Meanwhile, the part has been redesigned as a steel stamping.

Of course, the aluminum scrap drive proved a farce, but it can't be said that there were no warn-

MACHINE TOOL SCHOOL: Continental Machines, Inc., has organized the Doall trade school at Minneapolis to provide defense trainees one, two and three-month courses in machine tool operation. Classes are being trained on contour machines, surface grinders, lathes, shapers and milling machines and lecture courses are being given by Lloyd Erickson. J. T. Thompson, formerly of Oliver Equipment Co., is general director of the school.





Electrolimit Snap Gage

BELOW: An aircraft crankshaft gives up its tolerance secrets . . . you know it's correct to "tenths" with this gage.

Portable Accuracy gives a clear picture of your precision work . . .

This newest portable adaptation of the P&W Electrolimit principle puts tool room accuracy on the shop bench and at the machine. Our picture could not show it but this crankshaft is inspected *right in the machine*. The operator has a dependable gage, and he works to fine tolerances confidently, because he *knows* how much must come off. And the inspector is equally sure . . . he uses the same gage because

there is none better. Best of all, this gage is so easy to use that an operator can get accurate results after brief instruction. It speeds up the job, insures more accurate work, and cuts down spoilage.

For complete information on P&W Electrolimit Snap Gages, made in several sizes, write to PRATT & WHITNEY, Division Niles-Bement-Pond Company, West Hartford, Connecticut.



ings in advance about that. But there still are reports from Washington giving final returns on the aluminum collecting campaign and stating that 14,000,000 lbs. of scrap will yield material for 2800 fighting planes. Not only is it still true that aircraft specifications will not permit the use of such material (there are attempts to change the specifications) but if experience in Michigan is any indicator, collections of old aluminum pots and pans have not yet been taken from the wire fence enclosures where they were tossed by patriotic citizens. No one will make any predictions as to when these materials will reach a smelter.

There is a monument to the aluminum farce in the Detroit public works yard at Michigan Avenue and 195 19th Street in Detroit. There 220,738 lb. of aluminum awaits disposal. The total collected in the state is expected to be about 500,000 lb. but only about half of Michigan's 83 counties have reported round-up results. Outstate it is reported that many local collections still stand at the cross roads.

It is a little difficult to imagine any of the smelters getting excited about purchasing this material as long as they have collections of their own scrap and industrial aluminum scrap lying idle. That is the condition that exists.

The whole subject of scrap aluminum is controversial and shrouded in mystery, the first probably evolving from the second. It is possible to get as many explanations from aluminum experts as there are experts, but some facts appear to be clear anyhow. For instance, there is substantiation of the assertion that government officials erred when they ordered all industrial scrap returned direct to suppliers of original material. In many cases, the firms which thus received scrap could not process it at all. They simply didn't have smelting equipment, so the material piled up in a corner awaiting disposition.

There is a lot of "frozen" aluminum scrap in Detroit, and one source of information claims to have 150 tons of aluminum piston alloy which it now cannot use because the auto industry has been forced to switch over to cast iron. When defense officials are asked

about this, they pass it off by saying that the material will be used eventually or that it is "tentatively earmarked" for some application that will be useful in the defense program. The only defense applications that can be found so far is in the making of indirect defense items such as pattern plates, castings for X-ray machines, machine control parts, motor cycle engine crankcases, diesel engine crankcases, and some parts for tanks, submarines, etc.

There probably could be more of it used if some restrictions were lifted. The Navy is reported to be still standoffish about changing its regulation that all ornamentation and trim on vessels, etc., must be of virgin metal to resist corrosion. This specification stands, despite tests conducted by the American Society for Testing Materials. According to the industry which demonstrated through samples exposed at Key West, Sandy Hook, and other spots, that secondary aluminum is sufficiently resistant to corrosion by salt water.

PRIORITIES administration seems to be subject to some criticism in the rating granted for aluminum used for machine tools and some portable tools. Unless there has been some change in the very recent past, machine controls and housings for portable tools are still made of aluminum purchased under A-1-a rating, while airplanes rate A-1-c. To meet this need some suppliers are forced to degrade virgin aluminum to provide a material suitable for casting into these required machine parts.

The priorities situation and restrictions on sale and use of aluminum scrap has resulted in considerable increase of "toll" fabrication of scrap, which means that the user sends scrap back to the supplier for remelting and refabricating, paying only charges for labor and overhead. Thus, there is no "sale" of the scrap.

The materials situation for the automobile builder is constantly shifting. For instance, the industry was warned about a shortage of brass for radiators because of the tightness of the zinc situation. After switching over to copper radiators, the industry is being asked to change back to brass. Explanations are vague, but it appears that the crisis in copper is more severe than it is in the alloy. The indus-

try is seeking substitutes to replace both of these materials, but problems of conductivity, weight, size and production facilities are hampering the search, it is reported. Meanwhile, of course, Michigan copper mines are idle while the price ceiling controversy goes on.

Packard has announced its 1942 cars, with price shuffling which in some instances results in sharp reductions and—in a very few instances—represent even sharper advances in prices. The latter results from a decision to let the chips fall where they may and cut off the subsidization of the lighter Packards at the expense of the bigger cars. Packard has done an outstanding job in styling by simply taking up the Clipper theme which it advanced in the special new models introduced in the spring.

A COMPLETE line of Packard cars with Clipper styling is now available. Claimed by the engineering department is a resulting decrease of 19 per cent in wind drag at normal cruising speeds, a step-up in gasoline economy, under varying conditions, of 12 per cent to 18 per cent, a reduction in wind noise amounting to 20 per cent, improvement in steering steadiness when driving in gusty side winds that has been measured at 24 per cent, a 29 per cent improvement in riding comfort by reducing road shocks, a 14 per cent improvement in acceleration, a 32 per cent improvement in reserve power.

The Clipper, taking the cue from other cars announced in the last few years, offers the choice of either six or eight cylinder engine in the same chassis. The difference in price is only \$55.

The Packard line includes Clipper models of the one-ten, one-twenty, one-sixty and one-eighty super eight. In addition, Packard will continue to manufacture other traditional body styles in the higher priced cars. The conventional one-twenty has disappeared from the line and the Packard Clipper which was introduced in April takes its place. Along with it is a lighter six of the one-ten type, Clippers on the one-sixty and one-eighty super eight chassis have 127 in. wheelbase.

As a result of the price shuffling, the Clipper with the 8-cylinder en-

[CONCLUDED ON PAGE 115]



**HERE'S HOW TO GET MORE
OUT OF MACHINE TOOLS...**



**...and gain extra tool room
time in the bargain**

A

Suppose each tool you make could be made to produce more pieces—in fewer days—with less attention in service.

Would that give you the extra plant capacity and the extra man-hours of tool room time you need to meet today's conditions? It might not provide *everything* you desire, but it would prevent excessive interruptions to production—and it *would* reduce time spent in the tool room on the repair or replacement of worn or broken tools. Over a period, you could save enough time to account for substantial increases in plant and tool room output.

But how can you assure a better thousand plants are doing it by treatment of tool steel—by tools to determine the right procedures. They are using Method of Tool Steel Selection to insure



B

average of tool performance? More than a simplifying the selection and heat systematically pre-analyzing steels and the right hardening Carpenter's Matched Set consistently good results.

With the helpful literature shown on this page, you can easily put this method to work in your own tool room—and chances are that some of this literature is already on file there. If so, check into it now. You will be surprised at the way this system for simplifying tool room procedure fits into present needs—at the opportunity it offers for improving tools, relieving pressure on the tool room, and increasing machine output.



C

THE CARPENTER STEEL COMPANY, READING, PA.
121 BERN STREET



A Wall Chart Tool Steel Selector shows how to solve tool problems the Matched Set way.

B New Carpenter Tool Steel Manual—164 pages—detailed working data and heat treating instructions—plus a brand new alphabetical Tool Index that helps you quickly find the proper steel for each tool.

(Above literature FREE. Your Carpenter representative has copies for you.)

C Apprentice Training Book, "Tool Steel Simplified"—315 pages—over 20,000 copies in use. Price \$1.00 in U.S.A. Send orders direct to The Carpenter Steel Company, Book Department, Reading, Pa.

Washington

• Civilian business will rebound once defense need concentration tapers . . . Stettinius advocates "simple" priority system, says some commercial industries must continue to get raw materials.



WASHINGTON—At the OPM "priorities clinic" for the periodical and daily press last week, strong emphasis was placed on serious shortages of materials of various kinds, especially, as pointed out by former Priority Director Edward R. Stettinius, Jr., in minerals, metals and chemicals. Ever since the defense program was instituted there has been great stress placed on shortages. It clearly indicates the belief that in no other way can the public be aroused to the situation and its implications—the war danger to this country, and the sacrifices that lie ahead for civilian activities, including the "business as usual" philosophy and the routine of life. The purpose is commendable.

Yet, if overdone, the purpose may defeat itself. If the picture is painted too dark, the public might well get a feeling of futility. It might be inclined to develop a "what's the use" attitude, and relax rather than increase its effort. Much more effective are well balanced factual views, giving full importance to the shortage situation by all means, but also dashing a bright spot on the picture here and there as is well justified. For while there are humps to be leveled out in steel and other requirements, there can be no question that once in its stride this nation will produce what is needed to defend itself and assuming reasonable limitations, supply other nations that

are out to and will beat down the Axis powers.

THOUGH civilian sacrifices so far have been mild as related to what well may be expected in the near and more distant future, there will be some civilian business and growing civilian business once the "hump" of defense demand has been leveled out as it will be leveled out. When it will be leveled out is a question but as in steel, for instance, even the greatest expansionists think the pressure growing from concentration of defense needs will begin to ease up greatly toward the end of next year, even assuming an increase in the intensity and breadth of the War.

Mr. Stettinius gave a bright and sensible side to the situation when he said that there were some civilian activities which would have to be supplied, even at the expense of direct defense needs. The electric utilities and its need for copper was cited as an example and other examples might well have been added to support his contention that civilian life should not be disturbed to an extent which would be harmful to the whole rearmament effort.

There was foresight too in the observation of OPM's John Orchard, who in discussing the shortage in copper, said that "one thing we can do is to insist in the scheduling of defense orders that copper will not be taken until it is needed." It is suspected that already the hump in steel and other defense needs would even today be less prominent than it is if scheduling was more orderly, arranged according to present rather than long-time needs.

THIS situation gives force to the point made by Mr. Stettinius, who in the course of a discussion on what he said on an impending shortage of raw materials, said that there is nothing more important than to have the priority system work simply.

More orderly demands and production, it is commonly insisted, would develop a brighter iron and steel picture than that drawn by Stanley B. Adams, OPM's executive consultant of the Iron and Steel Branch. Under the present jam for quick tonnage there can be no questioning his statement that there is "definitely a shortage of pig iron" and his comment on

shortage of steel, especially of plates. In blast furnace, steelworks and rolling capacities, Mr. Adams could have relieved the picture, as it will be, by pointing to expansion plans. In plates, for instance, it will not be long until continuous strip mills will be converted for the production of this product, which, as in the first World War, is in heavy demand. It is hoped that some of this demand is not of the long range kind as happened in the previous hostilities when inspection developed large tonnages rusting at Hog Island.

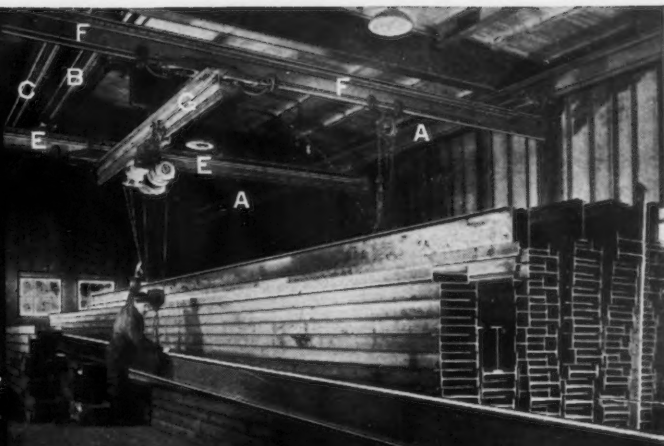
It is estimated that by converting strip mills, plate capacity can be increased to 8,000,000 tons—that's a lot of plates in any man's war. Present capacity as stated by Mr. Adams is 6,000,000 tons. Pig iron capacity he placed at 57,000,000 tons, though there are estimates that raise the ante by 1,000,000 tons. Mr. Adams fixed steelworks blast furnace capacity at 50,000,000 tons, giving 7,000,000 tons for merchant stacks. The pig iron shortage was assigned by Mr. Adams as the reason for OPM's M-17 order and the steel shortage as the reason for M-21 order.

SPEAKING of the latter, Mr. Adams said OPM is trying to classify steel, see who is getting it and emphasized that the group classifications on the form have nothing to do with preference ratings. He pointed out that all "producers"—including mills and buyers who remanufacture rolled products—covered in the order are going to submit monthly reports. The order provides for a better arrangement for steel distribution under what is often called an allocation plan.

While issued by the OPM Priority Division, the order is administered by the Commodity Section. It provides authority to allocate orders, say which orders a mill can take, and which orders come first. Moreover it provides authority to freeze a mill schedule. On that basis, Mr. Adams said, it is hoped to get around some of the defense problems.

There is general agreement that proper arrangement of orders and freezing of schedules will help solve the problems. It will serve much more effectively than a hit-and-miss arrangement for short schedules, because frequent changes of rolls involve a waste of tonnage, time and costs.

New AMERICAN MONORAIL Criss-Cross System AIDS PRODUCTION



Criss-cross or 3-level American MonoRail System stores steel taken direct from gondolas. (Letters on equipment correspond with those on layout below.)

Overhead MonoRail serves the punch (and all units) efficiently . . . fully covers the area . . . permits passing of loads . . . moves them easily.

THIS newly developed MonoRail System of rails, cross rails and bridges is a most efficient and economical means of overhead handling in small plants.

With this system you can place the load exactly where you want it—in storage, fabrication or shipment.

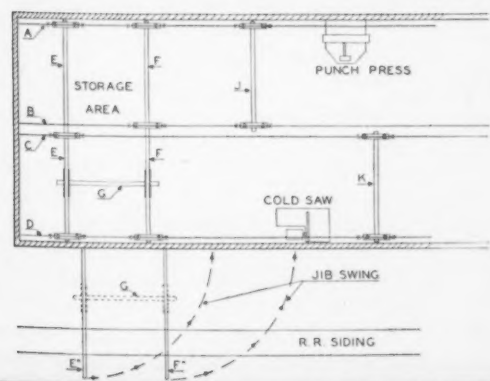
By eliminating floor congestion American MonoRail increases plant capacity. By providing superior mechanized methods for lifting and carrying, it increases the productivity of labor. Skilled labor is not required in its use. Operation and maintenance, a minimum. In many plants this low cost, flexible handling system has soon repaid its cost.

Just what saving you can realize can be soon determined by an American MonoRail engineer. Write us about your problem.

Ask for free copy of "Blue Book" illustrating numerous installations.

**THE AMERICAN
MONORAIL CO.**

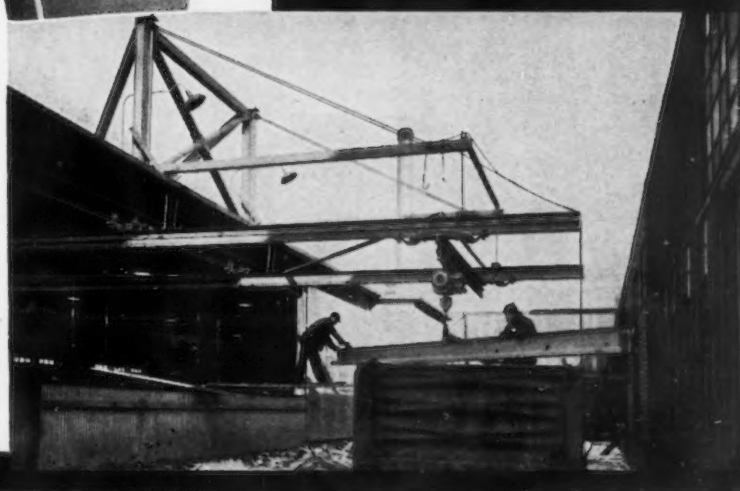
13103 Athens Avenue Cleveland, Ohio



Layout of shop showing 3-level MonoRail System.



In unloading or loading parallel jibs (E' and F' on layout) are swung out from building interlocking with tracks (inside) carrying MonoRail bridge equipped with electric hoist . . . unloads and stores without rehandling.



Henderson, Nelson Top Men in Latest U. S. Defense Shakeup

•••In its essential features, President Roosevelt's third shake-up of government defense machinery represents a victory for New Dealers and a setback for industrialists who 15 months ago were drafted by the administration to get the defense program under way.

Emerging as top men in the reorganization are Leon Henderson and Donald Nelson. OPACS loses its jurisdiction over non-defense priorities in the shuffle but Mr. Henderson continues as czar of non-defense allocation by being named director of a new OPM division of civilian allocation. In short, Mr. Henderson remains as head of the Office of Price Administration, and gets two new jobs in the defense picture. In addition to being designated director of the new OPM division he was named a member of the new Supplies Priorities and Allocation Board.

Mr. Nelson, former OPM director of purchases and now the new director of priorities, was appointed executive director of the new super board which is expected by the

White House to bring order out of chaos in handling the tough job of satisfying defense requirements without driving too many non-defense industries to the wall.

The reorganization embodies potentialities for smoothing the allocation of defense and civilian supplies but it removes from the domestic defense picture two key personalities recruited from industry—Edward R. Stettinius, Jr., former OPM director of priorities, and John D. Biggers, former OPM director of production.

The new seven-member planning board, in addition to Mr. Nelson, includes in its membership OPM Director General William S. Knudsen as the only other industrial representative. Other members are: Vice President Henry A. Wallace, chairman; OPM Associate Director General Sidney Hillman; Secretary of War Henry L. Stimson; Secretary of Navy Frank Knox; Harry L. Hopkins, special presidential assistant on lend-lease matters; and Mr. Henderson.

Mr. Nelson from time to time has advocated the establishment of a civilian planning board to pass on the competing requirements of both defense and non-defense industries. Privately, he is reported to have felt that such an organization was

essential to prevent industrial dislocations resulting from the inability of civilian industries to receive essential raw materials.

The super planning board, promptly identified as SPAB, is expected to concern itself immediately with priorities and allocations of materials but will eventually develop into a master planning agency, to survey long-term requirements of materials for defense purposes.

In the words of the executive order creating the agency, the board shall:

"Determine the total requirements of materials and commodities needed respectively for defense, civilian, and all other purposes; establish policies for the fulfillment of such requirements, and, where necessary, make recommendations to the president relative thereto.

"Determine policies and make regulations governing allocations and priorities with respect to the procurement, production, transmission, or transportation of materials, articles, power, fuel, and other commodities among military, economic defense, aid, civilian, and other major demands of the total defense program."

While the actual execution of all priorities and allocation functions will rest with OPM, through its existing priorities division and the new civilian allocation division, these activities will be carried on subject to the policy determinations of the new board. It will be the board, for example, which will determine out of a given tonnage of steel, the proportion to be allocated to defense orders, for lend-lease requirements, for Latin-American needs, and finally for civilian orders in this country. Carrying its functions further, the board will determine in general terms the proportion of steel and other materials to be divided between the competing demands from the automobile industry, the construction industry and other manufacturers of consumer durables.

OPACS and OPM were known to have had several jurisdictional disputes, the widest publicized involving the proposed curtailment of automobile production for the new model year. Defense officials minimized the conflict as one involving Mr. Stettinius and Mr. Henderson although many observers found difficulty in viewing it in any other light. In any event, the reorganiza-

THE BULL OF THE WOODS

BY J. R. WILLIAMS



tion ordered by the White House transfers Mr. Stettinius to the job of Lend-Lease Administrator while Mr. Henderson will henceforth hold down three defense jobs.

In issuing his executive order to assure "effective coordination of the priority powers and supply allocation activities of the government," President Roosevelt turned down proposed drafts drawn up by Mr. Stettinius' staff and approved by Messrs. Knudsen and Hillman as a method for ending the jurisdictional disputes. Instead he accepted the reorganization program drawn up by Samuel I. Rosenman, close White House adviser and a member of the New York supreme court.

Aside from adding a strong New Deal flavor to the SPAB, the part Chairman Wallace will play in the new picture was not entirely clear. Presumably, he will concern himself with the material requirements for economic warfare to furthering of administration efforts aimed at forestalling economic domination of South America by Axis forces.

The interests of Knudsen and Hillman are expected to center in domestic production problems, while the Secretaries of War and Navy will reflect priority and allocation sentiments of their respective departments.

Even if the new defense set-up is unsuccessful in ending conflicts between industry and New Deal points of view, the organization is such that it may be able to effectively cover such disputes from public view, thereby creating the appearance of a smooth-running defense mechanism. A White House statement explaining the shake-up said that the new agency will bring together for the first time around one table all the agencies in the government having "a major responsibility in distributing the available supply of materials in the United States."

Mr. Biggers, who in private life is president of Libbey-Owens-Ford Glass Co., in Toledo, has been named minister to England. He will be succeeded as director of production by W. W. Harrison, former deputy director of OPM's Production Division.

Following the reorganization announcement by the White House, OPM said that William L. Batt, former deputy director of the Production Division, has been appointed director of a newly-created OPM Division of Materials.

Sheffield AND THE CIMATOOL CO.

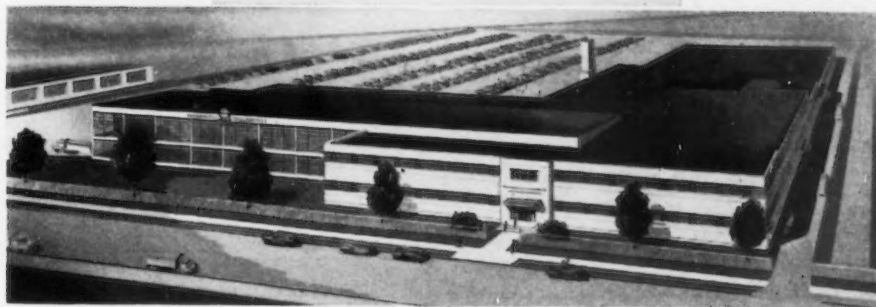
As a means of greater all around service and efficiency to industry and the great Defense Program, the Cimatool Company has become a part of the Sheffield Gage Corporation, and the name of the latter has been changed to

THE SHEFFIELD CORPORATION

with four principal divisions—the Gage Division, the Machine Tool Division, the Special Tool and Die Division and the Engineering Service Division.

With the new plant addition, more than two million dollars worth of production facilities are now combined in the greatest operations of the organization's history, operations that embrace precision gages, machine tools, dies, tooling, jigs and fixtures.

America's finest inland gage plant invites your inquiries on all precision products.

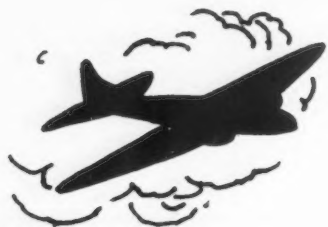


THE SHEFFIELD
CORPORATION
Gage Division • DAYTON, OHIO, U.S.A.



WEST COAST

• Senate defense subcommittee hears claims that OPM discourages development of low-grade Western ores, stalls in getting Coast aluminum plants under way . . . Douglas develops new mobile fuselage assembly line



PACIFIC COAST hearings before the national defense subcommittee of the Senate continued last week at Seattle with widely varied accusations which may be summed up in one phrase . . . that the Office of Production Management has discouraged development of low grade Western ores and untried processes for their utilization. Some of the testimonies were simply old troupers in new costumes playing to a different audience. Raymond Miller of the Bonneville Administration repeated his conviction that the Pacific Northwest could support a steel industry which, to him, means electric smelting of local ores using Bonneville power. He was backed up by George Evans, Seattle consulting mining engineer, who testified that "the Pacific Coast is just a big dumping ground now for big Eastern steel companies. Actually, there is unlimited coal and limestone in Washington for iron smelting. There are quantities of iron ore also in California, Vancouver Island and Alaska." Henry J. Landahl, Seattle mining engineer, elaborated this testimony by stating that there are one hundred million tons of iron ore which assay 30 to 48 per cent near Sumas, on the Canadian border.

The Seattle testimony with regard to iron ore echoes that heard farther down the Coast on chrome, manganese, and other metals. If all

the low grade deposits of various sorts could be developed as cheaply as their backers believe and processed by new methods which inventors believe think ought to be tried, the Coast would be in for a metallurgical rush which would make the days of '49 look like slow motion.

Some serious accusations were made. Bonneville Administrator Paul J. Raver said that the OPM was stalling in getting under way aluminum plants at Tacoma, Spokane, and Cascade Locks, Ore.

"We were told that the time element was all important," Administrator Raver said, "and yet almost three months have elapsed since Bonneville agreed to have service ready for these plants early in 1942. From an operating point of view it is essential that these plants be located so as to use existing facilities of the Bonneville Power Administration or facilities which can be made available within the time limit set by the OPM.

"We are disturbed by rumors of a possible change in the location of at least two of these plants. These rumors arise as a result of recent visits of experts from the Office of Production Management who have made purely cursory examinations of possible sites in the company of the chief engineer of the Aluminum Co. of America. The services of the Bonneville engineers were offered to these men in their inspection of these sites, but their services were not accepted. The fact that the Aluminum Co. of America's engineers are assisting in the selection of these sites is certainly significant and disturbing from the point of view of the future competitive positions of these government plants in the Northwest."

DETAILS of Douglas Aircraft Company's mechanized track-assembly lines will be announced publicly this week for the first time in the company's house organ "The Douglas Airview."

The magazine states that reductions of as much as 50 per cent in man-hours required for certain assembly units have been made since the mechanized track-assembly, nearly one mile long, was installed in the Santa Monica plant.

Rather than the aircraft industry taking a leaf from the book of the automobile industry, Douglas declares that sub-contractors in

Eastern automotive centers who are to supply the Long Beach factory are following closely the Douglas technique in setting up production lines. Murray Body, whose Detroit plant is now producing attack-bomber inner wings for assembly in the complete airplanes at the Long Beach plant, is following Douglas methods closely.

Latest innovation in mechanized methods at the parent Douglas plant at Santa Monica is a new mobile fuselage assembly line. This line combines the production advantages of "half shell" fuselage construction with a speed of moving, straight line assembly. In specially designed steel rails, tubular steel jigs move along, each carrying half an attack-bomber fuselage.

With four tracks in parallel operation, two pairs of fuselage halves are simultaneously in each working position.

Such assemblies need not be tediously set up and then removed from various jigs, for now the jigs themselves, containing the growing sub-assemblies move down the line.

The jigs in each line travel through eight working positions, their respective half fuselages progressively receiving framing, skin, rivets and inspection.

Upon reaching position No. 9, the sub-assembly is lifted from its jig and placed on carriers which continue it along floor tracks. At the same time, the jig itself is swung around and slid into a return track which takes it back to No. 1 position for repetition of the circuit. In moving along the return track each individual jig passes through a master jig where all working points are checked for the necessary precision that ensures interchangeability.

Last week newspapers quoted Donald Douglas, Douglas Aircraft president, as "disclosing for the first time" that the Long Beach plant will be doubled. This column stated on July 10 that "not yet officially announced is a large expansion in southern California by Douglas Aircraft."

REPORTS are prevalent here that construction of homes costing more than \$6,000 will be prohibited in the near future by the Office of Production Management. Just how this will be accomplished is not stated, but the inference is that priorities will be granted on

It's Testing Time



This single point adjustment is an exclusive feature in ALL Twin Disc Clutches. Easy and quick . . . no special tools needed. Simply pull up the pin, rotate collar to next hole and release the pin.

● It's testing time for industry . . . testing time for men, machines and management. In this critical hour, theories . . . experiments . . . cut-and-try methods are becoming conspicuous for their inefficiency. Sustained, high-speed production is demanding specialists of proved skill . . . machines of demonstrated efficiency . . . organizations of recognized ability.

That's why manufacturers and users of all types of industrial machinery entrust their clutch problems to the Twin Disc Clutch Company's 23 years of specialized experience in building clutches *to fit the job . . . not merely to fit the machines of which they are a part.* Why not submit your clutch problem to Twin Disc engineers? Twin Disc Clutch Company, 1370 Racine Street, Racine, Wisconsin.

Below, Left: *Twin Disc Power Take-off.*

Below, Center: *Twin Disc Model MT Duplex Machine Tool Clutch.*

Below, Right: *Twin Disc Model E Heavy-duty Clutch.*



TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U. S. PAT. OFF.

homes costing less than \$6,000, and that materials will not be made available for homes costing more than that amount. Private construction has been slowed down in Los Angeles, San Francisco, and Seattle because of lack of materials. Galvanized wire mesh is at a particular premium in Los Angeles. Bronze and brass hinges and all galvanized materials are becoming scarce in Seattle.

Los Angeles builders are encouraged by indications that the Division of Defense Housing Coordination may go to bat to see that priority recognition is given small dwellings to be used for defense housing.

Although most small manufacturers concentrating on non-defense business are convinced that they have been kicked around even before the opening of football season, on certain steel items they have been successful in placing orders where large consumers have not met with success. Coast representatives of some of the smaller Eastern specialty mills, particularly, have booked orders for small quantities, which they claim can be squeezed in between quantity schedules, where customers with heavier demands have been turned down.

IF there is any increase in the availability of cargo space for steel shipments around the Panama Canal, it is hard to discern. Nevertheless, one shipper reported last week that he had been offered space in excess of his requirements. Theoretically, the bulk of orders from the Coast have been placed by defense customers to whom the time element is important. Consequently, these customers have been more than willing to bear the added expense of shipment by rail. This, in turn, may have served to release some of the pressure for ship space, despite the large scale withdrawals from the Panama Canal run, but there certainly is no abundance of space in sight.

One cast iron pipe company reports that its difficulty has been in obtaining raw materials for its Eastern plant, rather than in getting shipments to the Coast. Pipe for the extensive military projects has come almost entirely by rail. Up until June 1 when the special rail rate to municipalities was withdrawn, most Coast cities and utility districts were willing to pay the

slight extra cost of rail transportation. The period from June 1 to Aug. 1 marks the end of the fiscal year for most municipal buyers, and with city coffers low little buying is done during that time. Several Coast municipalities have placed large orders within the past few weeks to cover their 1942 requirements. Again, the problem of transporting these pipe tonnages to the Coast is not so great as obtaining the pig iron with which to manufacture them. Suppliers are careful not to bind themselves with airtight delivery guarantees, and to what extent and at what time the orders can be filled remains to be seen. So far, even utility systems for defense projects have carried no preference ratings, and unless these are granted, extensive cantonment projects scheduled for early construction on the Coast may have difficulty in getting pipe. Although preference ratings have been granted for electrical power projects, water systems are still in the poor cousin class.

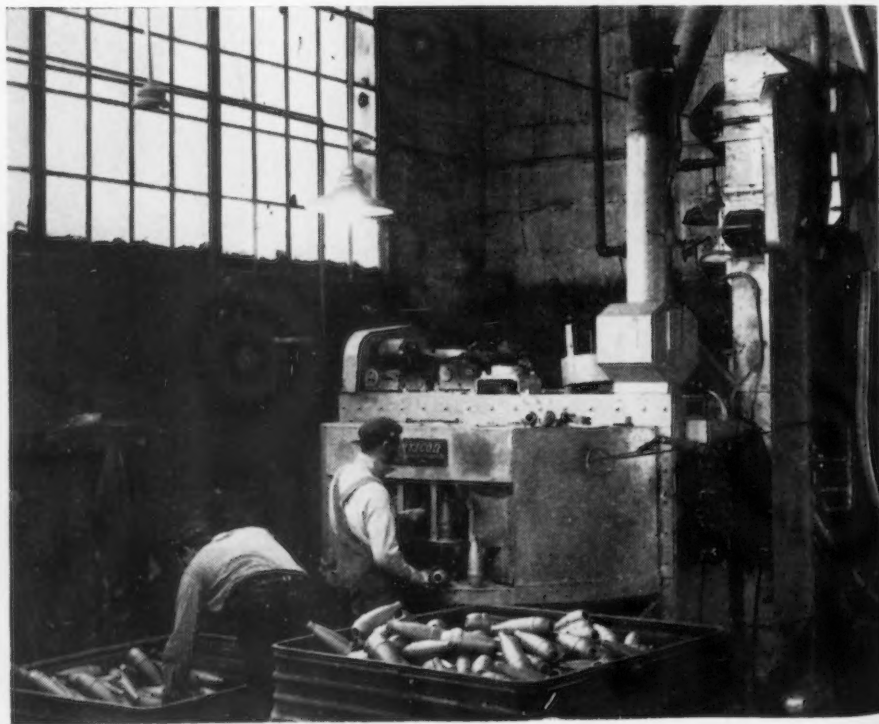
PAYMENT of \$4 million as final settlement on the collapse of the Tacoma Narrows Bridge has opened the way for reconstruction of the structure which collapsed Nov. 8, 1940, after bucking wildly in a high wind. The Washington State Toll Bridge Authority hopes to ob-

tain favorable priority on a new structure on the grounds that it is a defense link with the Puget Sound Navy yard at Bremerton.

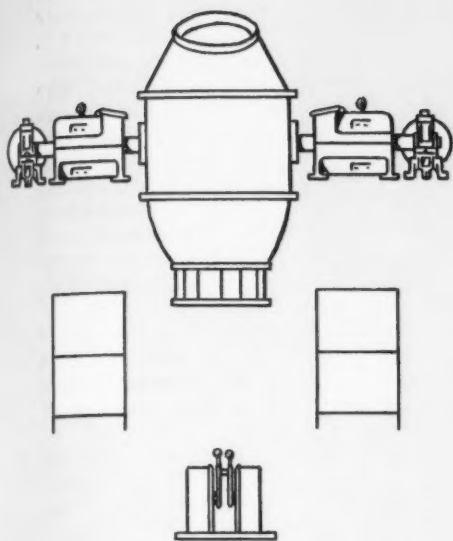
The same piers which supported the famous "galloping ghost" suspension span will be used for the new bridge. The most widely accepted cause for the collapse of the former structure is that the harmonic periods of the span and cables were almost identical, so close that once they started to vibrate, they moved almost together and the effect of the two vibrations was cumulative. In designing the new structure, engineers plan to break up this duet by making the towers about 100 ft. higher, lengthening the period of vibration of the cables, and by putting a deep truss girder under the roadway. The deck will carry four lanes of traffic, twice as many as the old span, and there is a possibility that a space between the center lanes will be left open to cut down the pressure against the bridge deck from up and down drafts which are strong in the Tacoma Narrows. A 25-ft. deep truss girder under the deck will be built in place of the 9-ft. plate girder which served as a sail on the old bridge. Cross members under the span will also be open work instead of the solid plate stiffeners which formed pockets in the old span.

CLEAN SHELLS: The defense speed-up hits shell cleaning. Special blast cleaning cabinet is shown cleaning 75 mm. shell interiors at the plant of Auto-Specialties Co., St. Joseph, Mich.

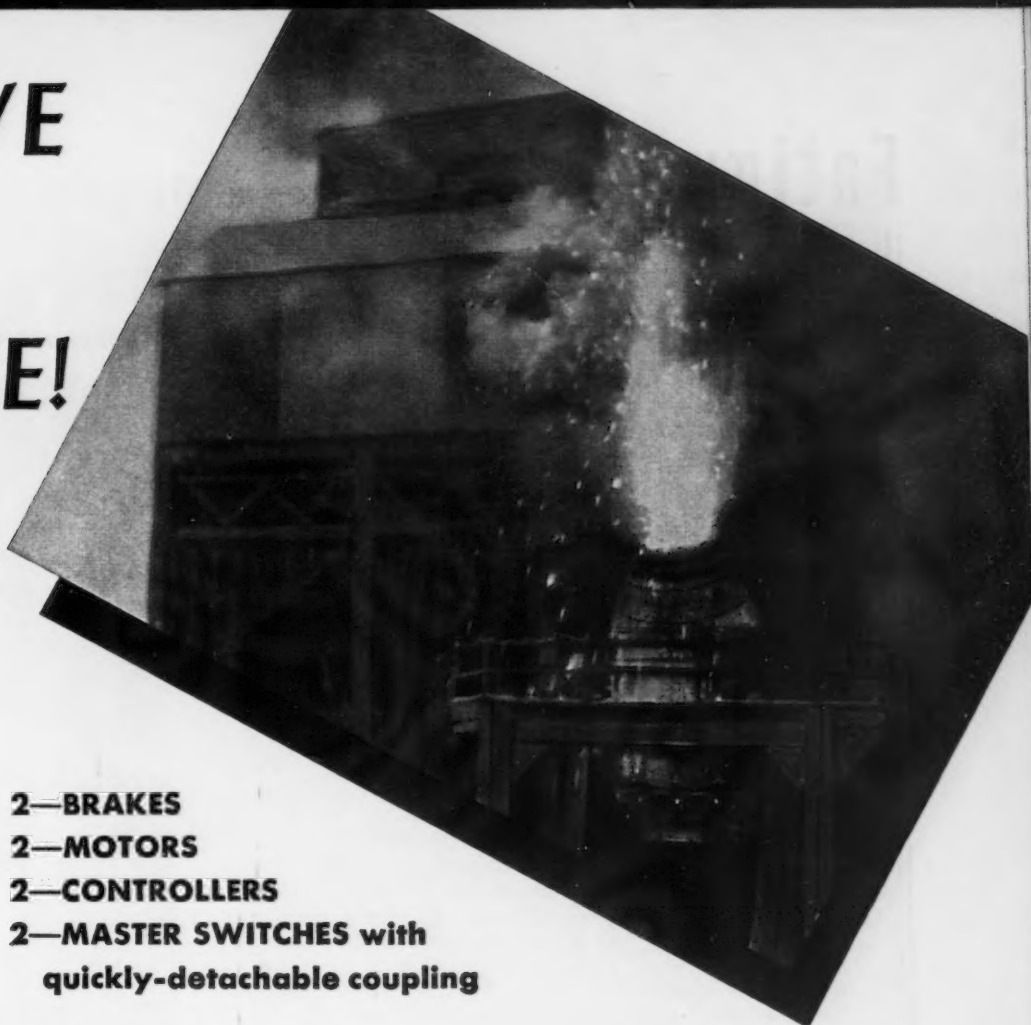
Photo by American Foundry Equipment Co.



A DUAL DRIVE for SAFETY'S SAKE!



- 2—BRAKES
- 2—MOTORS
- 2—CONTROLLERS
- 2—MASTER SWITCHES with
quickly-detachable coupling



but only **TOTALLY SAFE** *when* **PROTECTED by the**
EC&M Patented System of CONVERTER CONTROL

BESSEMER Converters are usually operated by two motors, connected through the gearing, to tilt the converter into various positions required for charging, blowing or pouring. The motors are usually of a size sufficient to permit emergency operation by one motor should the other motor fail and each is equipped with a magnetically-released, spring-set holding brake.

The EC&M Patented Control System—with series-wound Brakes, each Brake equipped with 2 separate windings for positive release of both brakes in an emergency should one motor become disabled—is the last word in control for Bessemer Converter and Hot Metal Mixer Tilt Motions. There is nothing safer. If a fault occurs in either circuit—in the brake, the motor or the controller—the other circuit maintains operation until the safe position of the converter is reached and this is accomplished without any delay—or any time lost to operate knife, disconnect or transfer switches.

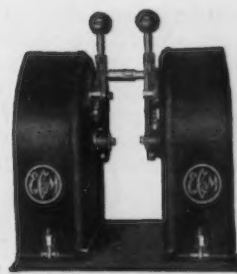
Besides eliminating the danger of metal spillage in an emergency, this EC&M Patented Control System, No. 1,899,586, simplifies the controllers, the wiring between the motors and the control and makes the installation not only lower in cost but easier to maintain. We invite you to discuss this system of control for Converters and Hot Metal Mixers with us.



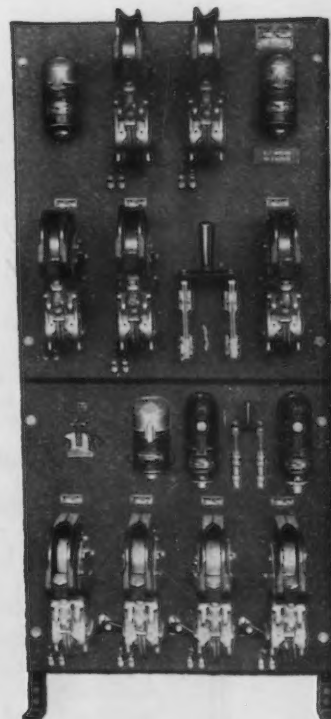
HEAVY DUTY MOTOR CONTROL
FOR CRANES, MILL DRIVES AND
MACHINERY • BRAKES • LIMIT
STOPS • LIFTING MAGNETS AND
AUTOMATIC WELD TIMERS.



EC&M Type WB Brake with
2 separate windings, one for
each motor.



EC&M Type NT Double
Master Switch, mechan-
ically connected by quickly-
detachable coupling.
Arranged for spring-return
to the off position.



Typical EC&M TIME-CURRENT
Controller for Bessemer Converter
Service. Of the Reversing-Plugging
Type, usually with Armature Shunt
Slow-down on first point.

THE ELECTRIC CONTROLLER & MFG. CO. Cleveland, Ohio

Fatigue Cracks

BY A. H. DIX

Initial Epidemic

• • • A class in business letter writing was asked the meaning of F.O.B. A young lady broke the silence by saying, timidly, "C-could it mean *flat open bottom*?" We picked that up from *Sales Management*, which warns against taking too much for granted in the use of abbreviations and initials.

If you asked the next ten people you meet what OPACS means probably not more than three or four could give you the exact answer and we would be one of the other six or seven. We have memorized it carefully several times but always go back to thinking it is something you buy in a drugstore.

Which reminds us that last week Tom Lloyd of the brains department was walking along Broad Street, Philadelphia, where the Veterans of Foreign Wars were holding their convention. V.F.W. posters appeared on every lamp post. Tom heard a girl say to her boy friend, "I thought the election was over." "It is," he answered. "Then why," she asked, "are those 'Vote for Willkie' signs still up?"

Troy Trouble

• • • Another thing that has always puzzled us is troy weight. We see by "On the Assembly Line" that indium is valued at \$12 per troy ounce. A troy pound, we know, is 12 ounces and an avoirdupois pound 16 ounces. But what we want to know is whether a troy ounce weighs the same as an avoirdupois ounce. The weight tables in the back of our drugstore dictionary are no help. They merely tell us that 20 pennyweights make a troy ounce and that 16 drams make an avoirdupois ounce, but are silent on the kinship of pennyweights and drams, so, like the maiden lady, we will probably die wondering.

Stoppers

Asahel Hubbard did a job for you!—*Jones & Lamson Machine Co.*

Sure he's crying—He wants to go to Cleveland with his "old man" — *Association of Iron and Steel Engineers.*

He Balked at the Garboes

• • • A Midwest manufacturer dropped in the other day to deliver a load of orchids and cabbages in person. Among the latter was a fervent squawk about the use of ten-dollar words in your favorite family journal. He claims that the language's *rara aves* should be kept caged, for, when let out, they give the reader the impression that he is being high hatted.

Of course, there are grounds for holding the directly opposite viewpoint: that the employment of etymological Garboes is a bow to the reader's erudition. The Chinese have a polite way of settling honest differences of opinion without argument by saying "Ni tung, wo si," meaning, "I east, thou west."

If our candid opinion were asked in this matter of ten-dollar vs. ten-cent words, we would lay our cards face up on the table, speak straight from the shoulder and take an uncompromising position squarely in the middle. We believe that a sprinkling of unusual words adds tang to an article, but that they should be added with an eyedropper, like juniper juice in making bathtub gin.

To make certain that your f.f.j. is not working the dictionary's hermits beyond the limits of the wages and hours act we have carefully inventoried the last several issues. All we can find in the high tension line are *fructiferous*, *febrile*, *collocation*, *titivation*, *tumid*, *climacteric*, and *burgeon*, or about one per issue. As the

average issue runs about 50,000 words, we are well within our quota.

Prophetic Pose



• • • This photograph of Under-secretary of War Robert Patterson, with index finger pointed skyward, brings back memories of Dr. Munyon, who used to be in the ads years and years ago. We don't recall what he advertised, but his slogan was something like "Dr. Munyon will cure you." As we recall him, he had thick hair, thin lips, a stern expression, and his finger was always pointed upward, as if he were saying, "I hear a Heinkel" or "There goes Halley's comet." But, of course, in those days there were no Heinkels, and today there is no Dr. Munyon, so things average up.

Time-Saver

• • • As you have long known, the members of the brains department lie awake nights thinking up new ways of making your favorite family journal more and more valuable to you. The latest bid for your love is the summary of priority and price regulations and developments, "This Week's Priorities and Prices." See page 79. You will find it useful when you have to read on the run.

Natal Novelty

• • • Bob Talmage of General Motors' Moraine Products Division, Dayton Ohio, has sent out one of the most novel birth announcements we have seen in a long time. It is in the form of an engineering bulletin describing a new material known as *Talmage*. Under "Specifications and Physical Properties" is:

Name: David Earl

Weight: 7 lb. 7 $\frac{3}{4}$ oz.

Applications: Every 15 min.

Tolerance: None

Inside diameter: Calls for constant attention at both ends.

The last page, headlined "*Behind Talmage*," reads:

A tour of the clothesline at the Talmages would reveal that there is plenty behind Talmage, which, instead of solving different problems, rather monotonously solves the same problem again and again. There is always something new, it seems, under the son.

Puzzles

Last week's farmer gets his trench dug for \$186.60 by digging 71.25 ft. along the left border and then 57.68 ft. diagonally to the lower right corner of the field. Gold stars for this one go to William Kostin and Alfred Liechten of United Chromium, Robert T. (Pittsburgh Tool Steel Wire Co.) Griffiths, and the infallible Lt. Com. A. R. Simpson.

You can credit A. W. (Youngstown Steel Tank Co.) Kelly for this balm for tired cerebrums:

If two coins are tossed in the air, what is the probability in 300 trials that they will show (a) both heads, (b) both tails, and (c) a head and a tail?

You've Got To Bat 1.000!

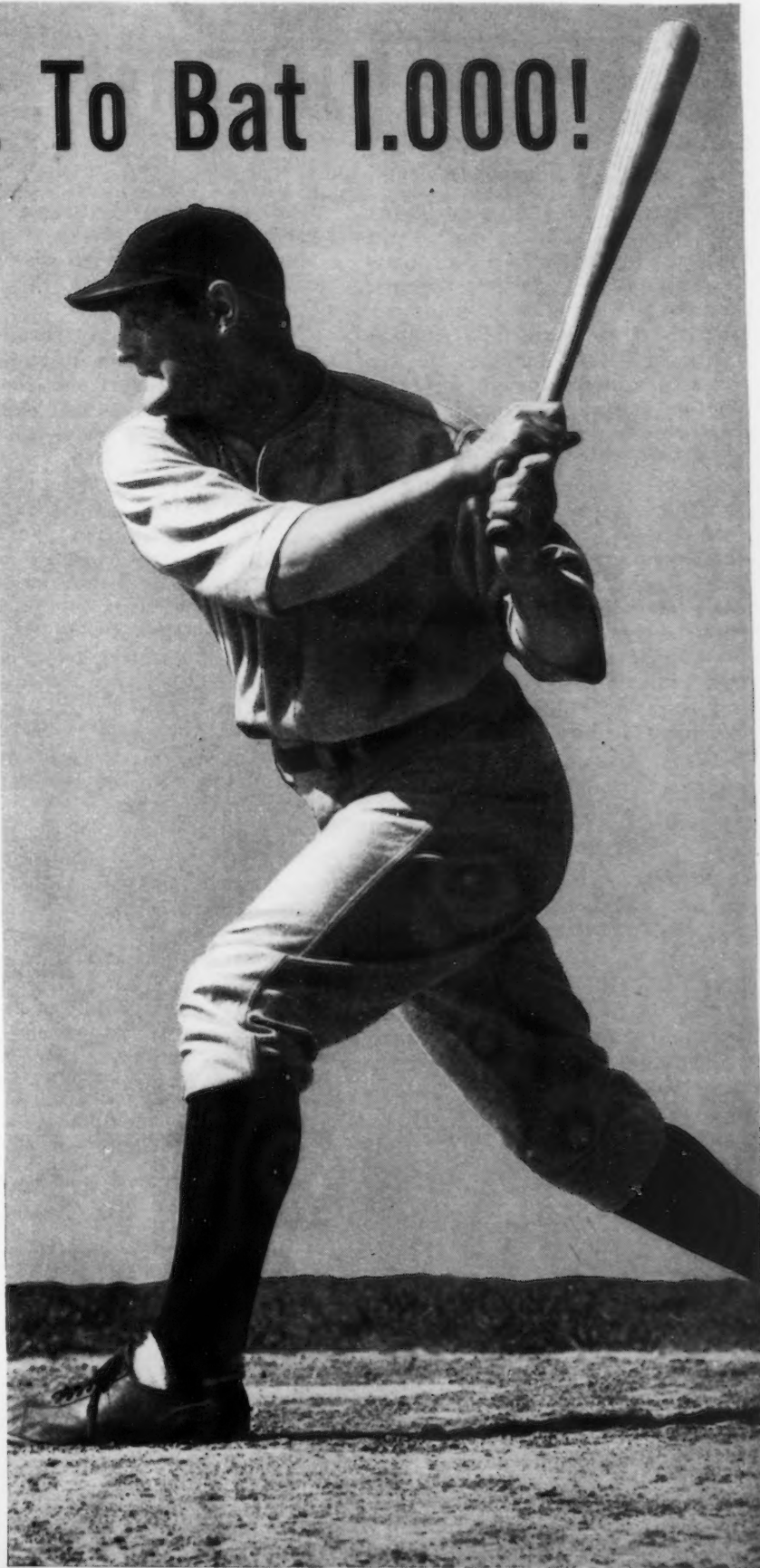
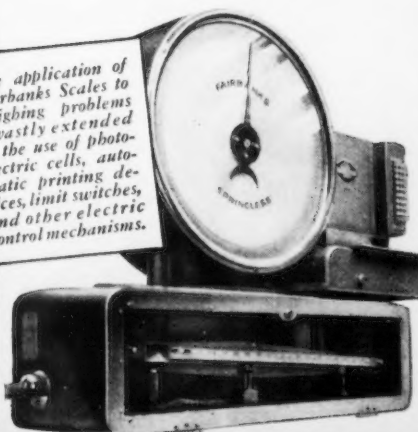
.400 will let you lead the league in baseball, but it will break you in business if it's your weighing average.

When it comes to weighing materials received, materials in process, and materials outgoing—you've got to bat 1.000!

How? With scales that weigh *faster*... even while materials are *on the move*. That *automatically* weigh and disburse *preset amounts*. That *count* small parts and products. That *print* records and receipts. That eliminate human errors in reading and recording weights and in interpreting scrawled weight records. That provide a fast, confidence-inspiring method of computing piecework wages.

Let a Fairbanks Scale Engineer study your methods, without cost or obligation. He can probably recommend applications of modern scales that will help you speed production, and save you money, too. Write Fairbanks, Morse & Co., Dept. I-38, 600 S. Michigan Ave., Chicago, Ill. Branches and service stations throughout the United States and Canada.

The application of Fairbanks Scales to weighing problems is vastly extended by the use of photo-electric cells, automatic printing devices, limit switches, and other electric control mechanisms.



FAIRBANKS · MORSE SCALES

DIESEL ENGINES ELECTRICAL MACHINERY RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS
PUMPS MOTORS WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS

This Industrial Week . . .

■ ■ ■

TO much of industry, Labor Day marked the end of the tooling up period for plants engaged in the country's defense, and the beginning of the mass production of war materials. Adaptability of U. S. industry to the stresses and strains of war production this week was being demonstrated more convincingly than ever before.

Some in industry, taking a breathing space on Labor Day from the growing struggle to keep their plants going against a rising tide of priority restrictions which daily seemed more complex, received cheer from an unexpected place. From President Roosevelt. In a radio address to the world on the war and rights of man, the President declared:

"These enemies know that today the chief American fighters in the battles now raging are those engaged in

Industry Also a Chief Fighter

in American industry, employers and employees alike." To be classified as a "chief fighter" by the President is an unusual experience for U. S. industry, but one which, in this case, they took in stride because the title seems to have been earned in many plants in many industrial areas.

In the first large-scale exhibit of how industry has adapted itself to defense goods production, Chrysler Corp. last week told the world that, of all big industries, the automobile industry is one of

Auto Plants Show How

the quickest to move. This company has already gone into mass production of tanks, not the midget variety. It is only six weeks away from substantial production of fuselage sections for Martin medium bombers. Mass manufacture of 40 mm. Bofors anti-aircraft guns by Chrysler is not far off. K. T. Keller, Chrysler president, said: "We already have some of the (defense) fruit coming off the trees."

Outstanding among the Chry-

sler defense projects is the tank arsenal, a five-city-block structure with three assembly lines that are producing 28-ton tanks at a rate approaching 10 a day. Thousands of tanks will roll from this plant during the next year.

While production results at many plants are not up to the expectations of everyone, industry

Couldn't Be Done Faster

itself evidently feels that the job, with all factors considered, could not be done much faster. One long step toward unification of U. S. defense efforts was taken last week in the President's third shake-up of the Government's machinery to speed defense. At first glance the reorganization represents progress for the New Deal and a setback to the industrialists who 15 months ago were drafted to get the national defense program under way.

While the new super board has potentialities for smoothing the allocation of defense and civilian supplies, it removes from the domestic picture two key men recruited from industry—Edward R. Stettinius, Jr., former OPM director of priorities, and John D. Biggers, former OPM director of production. One of the ablest men to rise in the reorganization is

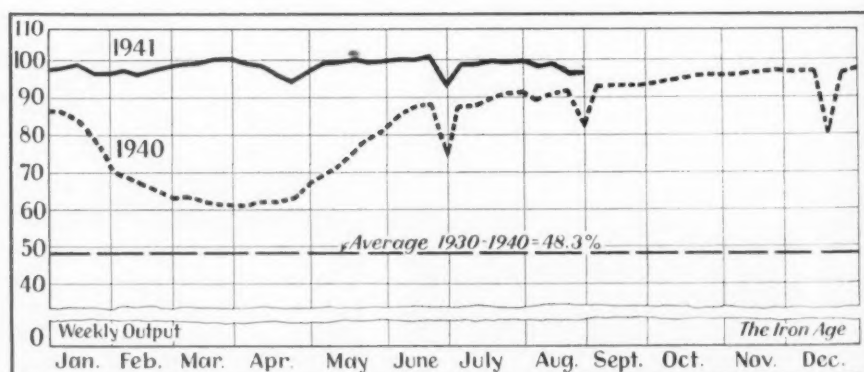
Donald Nelson, former OPM director of purchases, who becomes executive director of the new seven-man board. Industry recalls that Mr. Nelson has frequently advocated establishment of a civilian planning board to pass on competing requirements of both defense and non-defense plants.

Meanwhile the plight of plants facing possible extinction through the workings of the complicated priorities system shows no improvement. Typical of the position of the small metal-working company without defense orders is this letter to THE IRON AGE:

GENTLEMEN,

"We have your favor of the 11th and are sorry we have no defense orders. We are a small concern and like many others we do not see any possibility of getting any and just to read about large orders being placed by the Government is not going to help us. We have tried through numerous sources and frankly do not think there is much hope. We haven't the capital, the equipment or the men, and we are no different from many small concerns who have from 10 to 20 employees."

Steel Ingot Production—Per Cent of Capacity
(Open Hearth, Bessemer and Electric Ingots)



Steel Ingot Production, by Districts—Per Cent of Capacity

	Pitts- burgh	Chi- cago	Val- leys	Phila- delphia	Cleve- land	Buf- falo	Wheel- ing	De- troit	South- ern	S. Ohio River	West- ern	St. Louis	East- ern	Aggre- gate
Current Week	96.0	101.0	96.0	91.5	98.0	103.0	90.0	99.0	96.5	98.0	100.0	108.0	94.0	96.5
Previous Week	100.0	100.0	97.0	92.5	96.0	103.5	90.0	99.0	96.5	101.0	100.0	110.0	95.0	97.0

While some small plants may find themselves in a hopeless position until the shortages of material like steel pass—and they will pass—other non-defense plants may owe part of their difficulties to their own inertia. At Chicago the Defense Contract Service this week warns such non-defense plants to stick out their chins and fight. "Don't stop soliciting after submitting a list of your plant facilities," the defense agency said. "Too many firms are never heard from again. The aggressive firm keeps coming back."

Small Plants Told to Fight

A successful Chicago sub-contractor urges: "Keep the attitude that the government right now is the biggest sales prospect in the world and go after his business as wolfishly as in regular trade channels." To many non-defense plants, such advice looked easy to give but hard to take.

Attacking from another direction the dislocation of industry not having defense orders, the OPM is surveying communities and industries struck by material shortages, and the Army and the Navy will be asked to place contracts in these areas on a basis of OPM findings. A preliminary list of such industries shows stove, electrical appliance, washing machine, zipper, aluminum ware, metal office furniture, refrigerator and such consumer goods industries particularly hard hit. The OPM hopes to convert these industries to war work as some aluminum pot and pan makers were recently converted to rolling brass and drawing cartridge cases.

Difficulty in getting supplies has extended to the vital machine tool industry. A recent survey of such plants showed that 20 out of 85 reported troubles in obtaining sufficient materials, parts and other supplies. At the same time 61 of the 85 machine tool plants reported shortages of skilled men and 24 found a scarcity of supervising personnel.

Steel producers, endeavoring to make enough of that metal to go around, this week found another customer, Russia, inquiring for large tonnages of almost all types

THIS WEEK'S

Prices and Priorities

Scrap iron and steel will be subjected to priority control shortly, it was asserted last week. Control will be similar to recent pig iron order, and may include use of an emergency pool. Dealers were warned that use of "sanctions" was likely if price maximums are not observed. (OPACS-PM1034.)

Cincinnati established as a basing point for scrap and method of computing price for rerolling rails revised Aug. 27. (OPACS-1024.)

Defense orders must be accepted by all manufacturers, according to terms of Priorities Regulation No. 1 issued Aug. 28. Order lists rules and regulations which will apply to administration of priorities. (OPM-PM1022.)

Nationwide stabilization of the shipbuilding wages for the duration of the war announced, following ratification of zone standards for Great Lakes district by OPM, Navy, Maritime Commission and AFL. (OPM-1025.)

Automobile production curtailment and its effect upon labor was the subject of a meeting in Washington, Sept. 3, of five AFL auto union representatives and OPM labor division. (OPM-1025.)

Half a pound of aluminum per dwelling was reported realized in the recent community scrap aluminum drive. Total collection put at about 14,000,000 lb. (OCD-PM1026.)

Communities and industries hit by material shortages being surveyed. Special efforts will be made by Army and Navy to place contracts in such communities found to be unduly affected. (OPM-PM1032.)

Pig iron consumers are urged to file inventory form PD-70. Forms should have been filed by Aug. 15. (OPM-PM1011.)

Cutting tool orders for non-defense work may now be accepted provided that production and delivery of defense orders are not prejudiced, according to two slight changes in the tool priority order announced on Aug. 31. Distributors have been given a preference rating of A-10 for obtaining equipment for defense work. (OPM-PM1062.)

Tungsten was the subject of a new preference order and civilian allocation program announced Sept. 2. This latest order supplements and expands the order of March 26 which covered some forms of the metal. No deliveries can be made without authorization of priorities division. (OPM-PM1061.)

Motor truck production will be facilitated by the blanket preference order issued on Aug. 30 to assist manufacturers obtain scarce materials. Rating of A-3 has been assigned for heavy and medium trucks, trailers, motor and electric passenger vehicles and replacement parts for these vehicles. Ratings may be used only upon authorization by priorities division. (OPM-PM1065.)

Cadmium producers have advised OPM of their willingness to continue to sell the metal at prices not above 90c. a lb. for sticks and 95c. for anodes, it was announced on Aug. 30. (OPM-PM1052.)

★ ★ ★

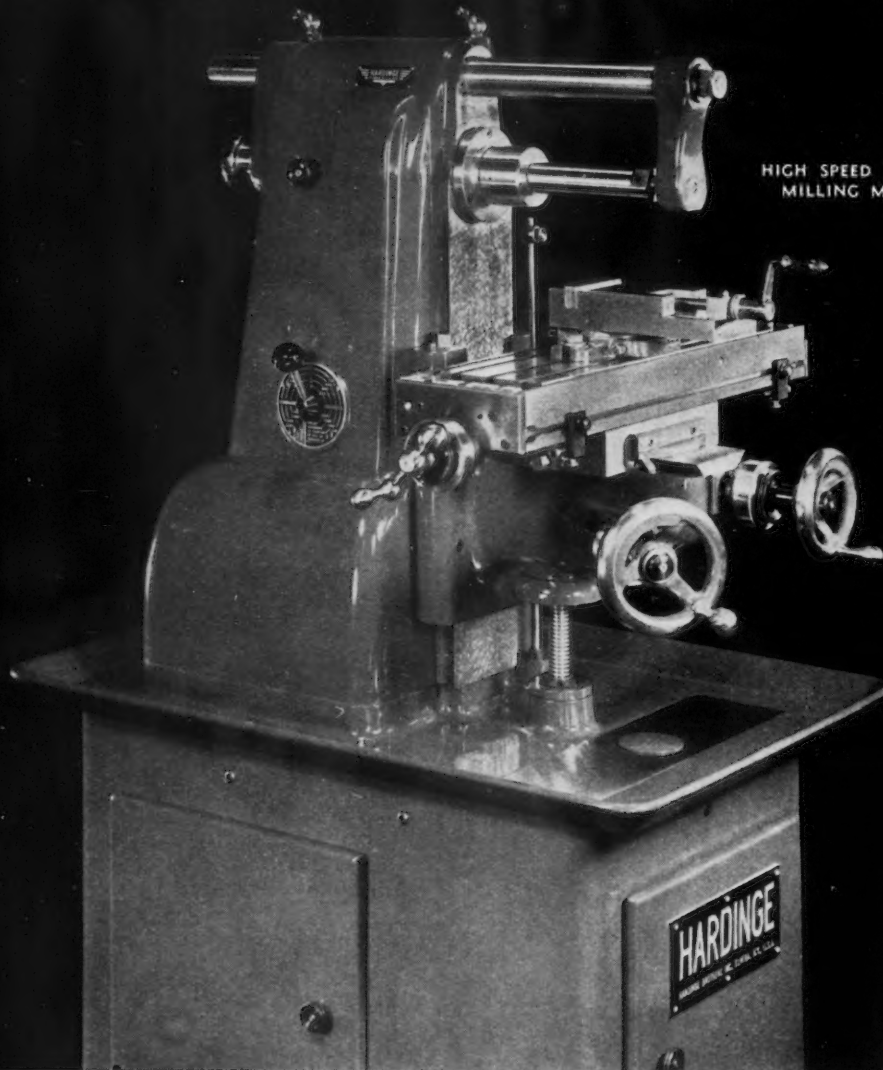
For copies of above announcements address defense agency concerned, at Washington, giving announcement number as shown in brackets after each paragraph. (OPM-PM1032 means announcement 1032 issued by Office of Production Management.)

of steel. In the face of such a demand from so many places, Labor Day this year meant little as a production holiday and ingot output for the country dipped only a half point to 96.5 per cent, from the 97 per cent rate prevailing last week.

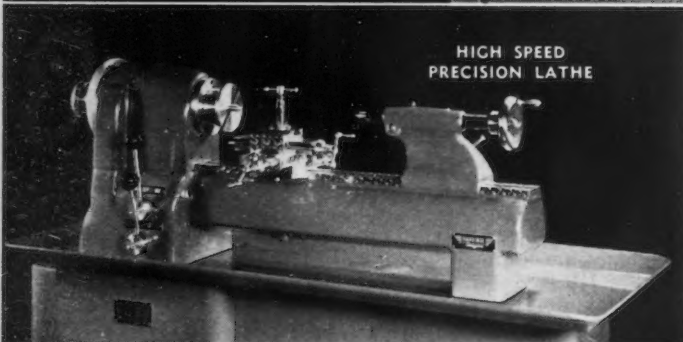
The steel industry as a whole closed August order books with total specifications equal to or slightly greater than the July tonnage. Some companies reflected gains last month as much as 30 per cent above July, with orders in the

past week particularly heavy for plates, shapes, bars and oil country goods. The steel companies are expected to provide a complete report on shipments, orders and unfilled backlogs to the OPM about Oct. 1. This report apparently will recapitulate information now being supplied by steel consumers on PD-73. All steel orders now must carry this form and by Oct. 1 most of the unfilled steel tonnage on company books will be properly cataloged and classified for the OPM.

HARDINGE



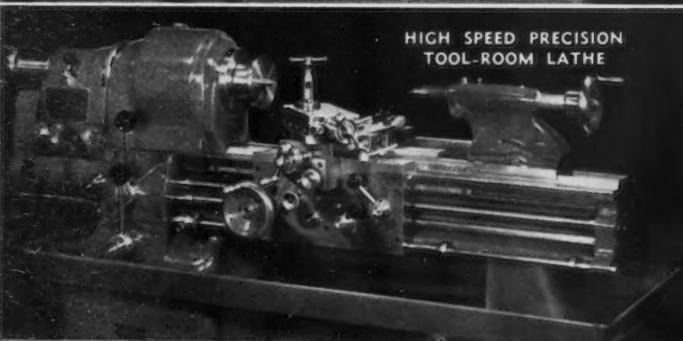
HIGH SPEED PRECISION
MILLING MACHINE



HIGH SPEED
PRECISION LATHE



HIGH SPEED PRECISION
SECOND OPERATION MACHINE



HIGH SPEED PRECISION
TOOL-ROOM LATHE

UNUSUAL CAPACITY

(No. 3 of a Series)

Hardinge pioneered the feature of having ample collet capacity. While always desirable, this feature is of particular value today. With it is combined the Hardinge preloaded ball bearing spindle construction, providing a range of spindle speeds for the proper machining of bar material, varying from 1/32" to 1" diameter or chucked work to 5" diameter.

The Hardinge 1" collet capacity is not through the use of a sleeve or other arrangement, but is direct in the spindle to provide the greatest degree of accuracy.

Another added advantage is that, with Hardinge, there is a matched relation between the various machines for interchangeability of collets, as well as a number of other attachments used in the spindle of each machine.

"Specify Hardinge and you are assured of engineered efficiency."

HARDINGE BROTHERS, INC.

ELMIRA, N. Y.

"Performance has established leadership for Hardinge"



Chrysler Shows How Swiftly Detroit Turns Into Defense Arsenal

Detroit

•••With censored words like "many," "soon," "large" and "fast" to describe quantities, beginnings of production, size and performance of its products, Chrysler Corp. last Tuesday demonstrated its "assembly lines of defense" to 250 editors and publishers from all parts of the United States.

It was the first large-scale visual evidence of the fact that the automobile industry has turned its productive efforts from the building of civilian vehicles to the output of war materials.

It also signified the turning point from "make-ready" and tooling-up stages of defense projects to initial mass production of vehicles and weapons required by the Army, Navy, Air Corps and participants of the American lend-lease program of armament.

The Chrysler preview, which included a preview of Plymouth, Dodge, De Soto and Chrysler cars and trucks, gave the first rounded picture of what this automobile company has done in preparation for mass output of tanks, airplanes, anti-aircraft guns, military trucks and weapon carriers, and special engines for defense. It

started with a visit to the new building at the De Soto plant which will house the Gun Parts Arsenal, and lasted all day with successive visits to the airplane fuselage assembly plant, the tank arsenal, military truck plant, and the Bofors gun plant. It included inspection of the preparations being made for production, and also inspection of the actual production of some of these items. Proving ground tests of tanks, trucks, reconnaissance cars and the Bofors gun were dramatic parts of the day-long program.

Outstanding in the Chrysler defense projects is the Tank Arsenal, a new structure five city blocks long that has risen since last November from a cornfield in prairielands north of Detroit. Today it is tooled up and in nearly full-out production. Three assembly lines, lined with a hundred tanks in various stages of completion, is spewing out these 28-ton M-3 medium tanks at a rate approaching ten a day. Heavily armed with machine guns and cannon of 75 and 37 mm. size, the tanks are loaded and shipped by the trainload, ready for action. Six thousand men are at work in the plant today.

Within six weeks of reality is the start of production of the nose and center section of the fuselages for the Martin medium twin engine bomber, according to K. T. Keller, Chrysler president. Some

DETROIT-MADE: Nose section of the fuselage of a Martin medium bomber is shown above. This and the center section, together comprising principal parts of the airframe, will be made on Chrysler assembly lines in huge quantities and shipped to the Martin, Omaha, Neb., assembly plant. The two sections contain 4000 lb. of aluminum, 11,500 parts.

machinery already is in place for manufacture and assembly of the 40 mm. Bofors rapid-fire anti-aircraft guns, one of which was towed by a siren-screaming weapon carrier truck into the Highland Park plant assembly building, set up and fired skyward in a demonstration for the press.

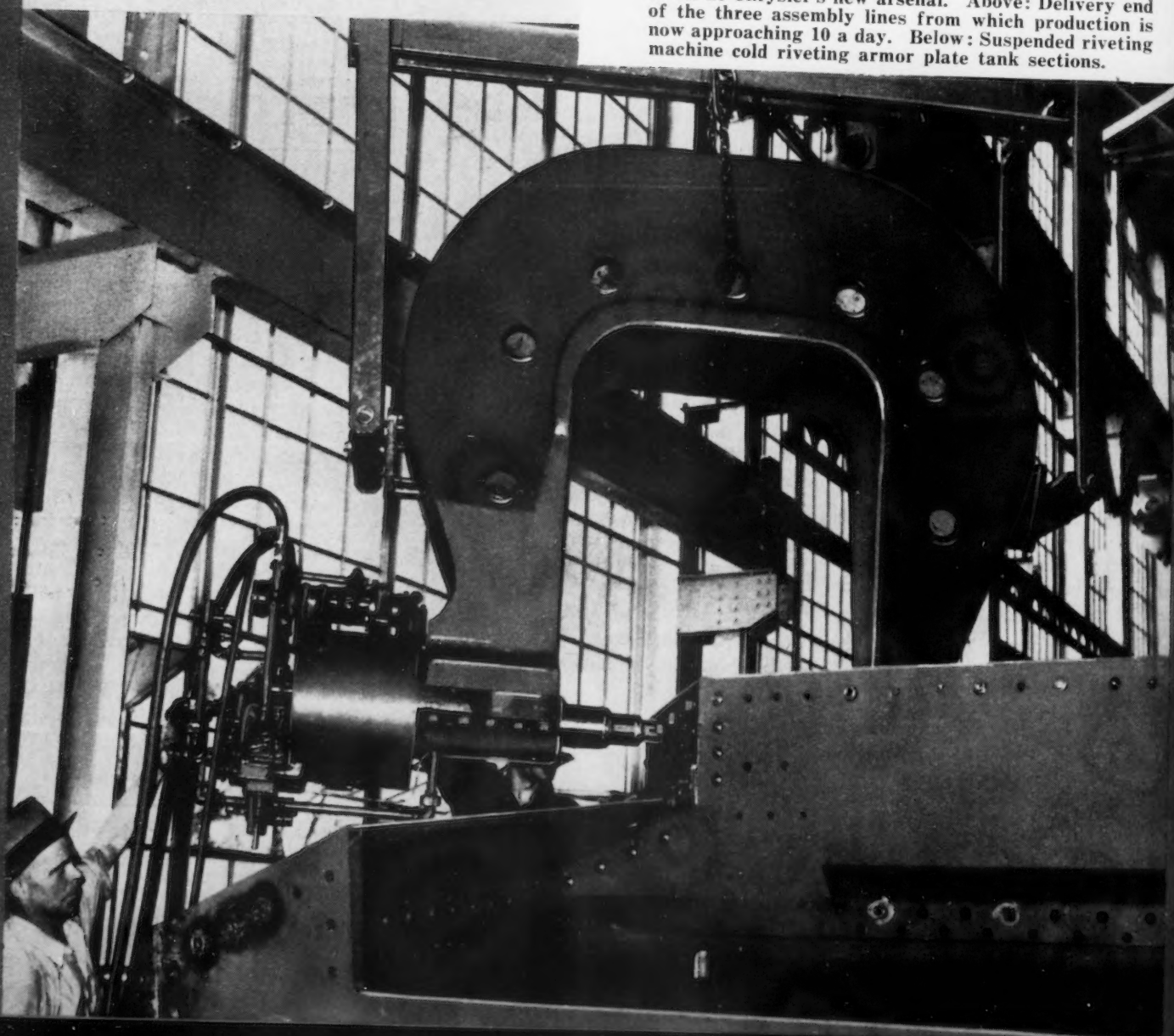
"The airplane job is in this position today, that we are about completing pretty nearly two million hours of tool room work to get the equipment ready for this plant," Keller declared. "And in the next six weeks this equipment will begin to roll into this plant and the thing will begin to take form." He explained that "it is a good bit like the yeast working in the dough before you get it in a loaf of bread and put it into the oven; it is hard to see the yeast working."

STORY CONTINUED ON PAGE 84

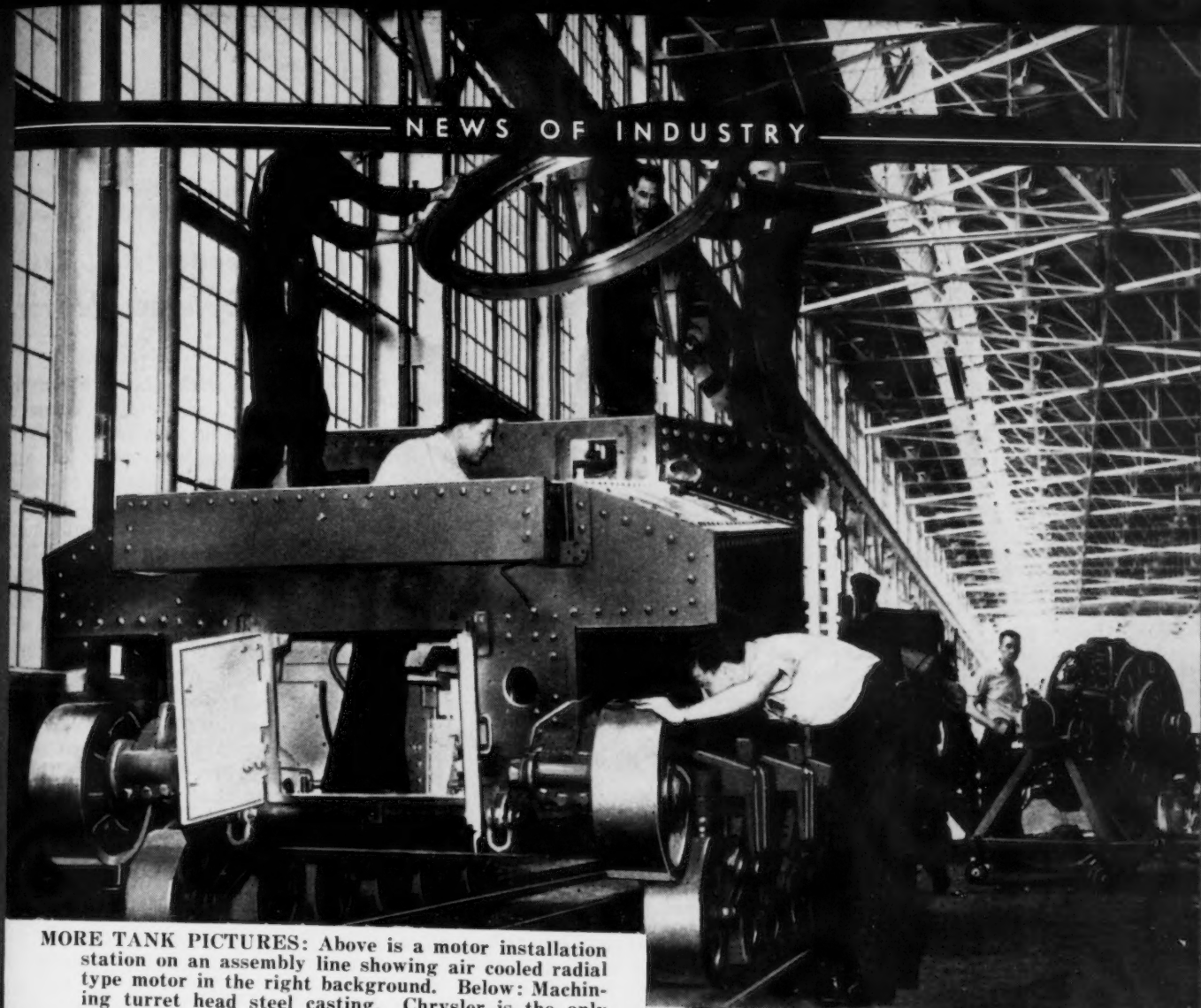
TURN PAGE FOR PICTURES



FIRST NEWS PHOTOS of quantity production of medium tanks at Chrysler's new arsenal. Above: Delivery end of the three assembly lines from which production is now approaching 10 a day. Below: Suspended riveting machine cold riveting armor plate tank sections.



NEWS OF INDUSTRY



MORE TANK PICTURES: Above is a motor installation station on an assembly line showing air cooled radial type motor in the right background. Below: Machining turret head steel casting. Chrysler is the only auto company so far to produce complete tanks.



"The defense program—and I would say that our area is fairly typical of the nation—is in that phase where you have fruit coming off some of the trees, and where on the other hand you have a lot of this preparatory work which is hard to see coming to full development," he explained.

Also revealed for the first time was the fact that Chrysler is designing a 500-hp. liquid-cooled tank engine, in addition to the 2000-hp. liquid-cooled V-16 airplane engine now in preliminary tooling stages.

The following was revealed about the Chrysler Corp. part in the defense program: The firm has undertaken contracts exceeding \$400,000,000, the execution of which now is its major manufacturing activity; more than 85 per cent of engineering and research activities in Chrysler are devoted to defense; shipment of Army vehicles has passed the 55,000 mark and is now at a steady rate of 250 cars and trucks a day; engineers are engaged in development of a new airplane landing-gear strut, cargo ship propulsion machinery (full-sized experimental units soon to be delivered); is in virtually full operation in the largest medium tank arsenal in the United States; is preparing almost a 1,000,000 sq. ft. of floor space for bomber fuselage assemblies and production; is preparing another 600,000 sq. ft. for production of anti-aircraft cannon; has designed, built and put into operation a new duralumin forging and die shop; has produced at Airtemp (Dayton) division a variety of field kitchens, tent heaters, cantonment furnaces, refrigeration compressors and propeller stands; has produced Oilite powdered metal parts for defense machinery; has produced and equipped vans for truck maintenance work, and is conducting schools to train Army officers for the motorized forces.

At the bomber fuselage assembly plant it was pointed out that, whereas an automobile body weighs about 1000 lb., the nose and center sections of the bombers will require about 4000 lb. of aluminum alloy material. Overall length of the two fuselage sections will be 33 feet, compared with eleven to twelve feet for an auto body.



BEVIN OF BRITAIN: This is Ernest Bevin, British Minister of Labor and National Service and one of the most powerful of British labor leaders. At various times he has urged workmen in U. S. industrial plants to do their best to build combat equipment for the democracies.

Lack of Plates Holds Up Navy Tug Construction

Buffalo

• • • Construction of Navy tugs by the Niagara Shipbuilding Corp., here, has been delayed about two months through inability to get steel despite an A1-B priority rating, the company said this week. "We had planned to begin construction of the first tug by the end of July, but it's doubtful whether the first keel will be laid before the end of September," Vice-President and Construction Manager John Hauser said.

Gisholt Lifts Wages

Madison, Wis.

• • • The Gisholt Machine Co. is granting a \$100,000 payroll increase to a majority of its employees, chiefly newer workers, who have shown marked improvement in efficiency and skill during their learning period. The increase was not solicited by the union.

41,800 Miles of Steel Pipe Needed For Vast New Defense Network

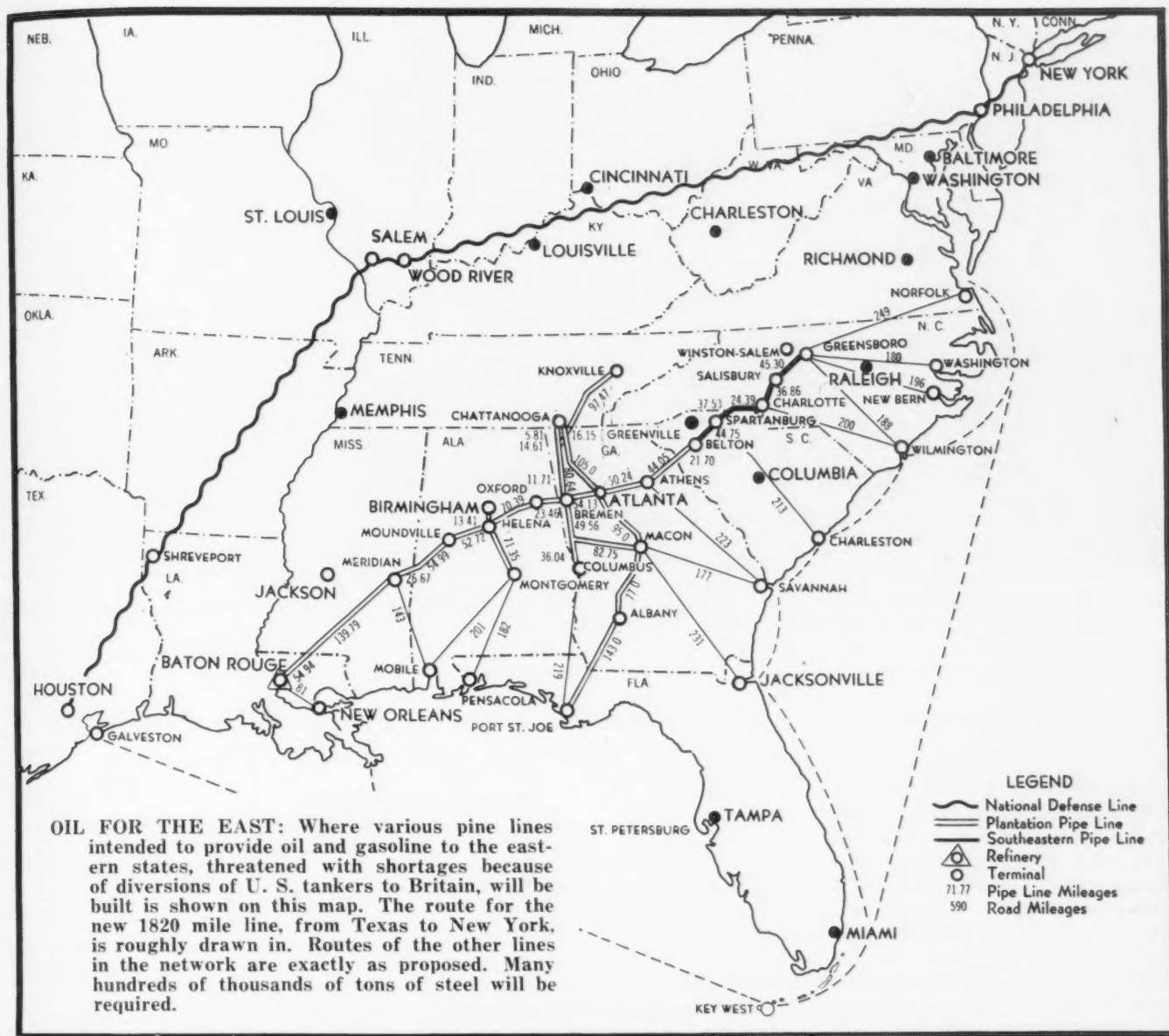
Washington

• • • Faced with the problem of having large pipe line projects built from southwestern fields to overcome the shortage of oil and gasoline on the Eastern seaboard, Petroleum Coordinator Harold L. Ickes has established a joint commodity section of the Office of Production Management and the Office of Price Administration and Civilian Supply to handle defense priorities and civilian requirements, respectively, of huge steel tonnages and other supplies that are entailed in the program.

So large are the steel requirements that Mr. Ickes' office thinks it unlikely that more than 70 per cent of the total tonnage and 50 per cent of the alloy material for such needs as pits, tool joints, drill stem, etc., will be available during the fiscal year which began July 1. Pipe sizes range from 4 to 26-in., divided about equally between seamless and welded section. The total pipe line construction may be about 3800 miles of line pipe and wells to be drilled will require about 30,000 miles of steel pipe. Then additionally there are large requirements for auxiliary equipment.

It is in the drilling fields where there is most concern over getting preference ratings for supplies. It is estimated that equipment for these fields will take about 1,100,000 tons of steel, mostly of grades B (mild carbon), C (medium), and D (high tensile).

Because of their great number it is not practical to give ratings to individual oil companies for materials. Instead each field will be given project ratings. All properties in a field are considered as sub-projects and consequently come within these ratings. Applications for priorities on materials and equipment are passed upon and recommendations made by the office of the Petroleum Coordinator before going to the OPM. Under this arrangement the high ratings of A-1-a for materials needed in the construction of a pipe line from Portland, Me., to Montreal was obtained as a defense measure.



There are four main projects in the program:

1. An 1820-mile system to pour 250,000 bbl. of crude oil daily into the New York-Philadelphia area. It will be the longest single pipe line in the world, and will cost \$80,000,000, to be jointly owned and privately financed by the National Defense Pipelines, Inc., and a smaller corporation to be known as Emergency Pipelines, Inc., consisting of 11 oil companies.

The plan for National Defense Pipelines, Inc., contemplates the construction, operation, and maintenance by it of the following facilities for the transportation of crude oil:

A 22-in. pipe line originating west of Shreveport, La., near the Texas border, extending in a northeasterly direction to near

Salem, Ill.; distance approximately 490 miles.

A 16-in. connecting line from Salem to Wood River, Ill., to tap existing facilities carrying oil from Oklahoma, Kansas, Texas, Mid-Continent, and Illinois areas; distance about 65 miles.

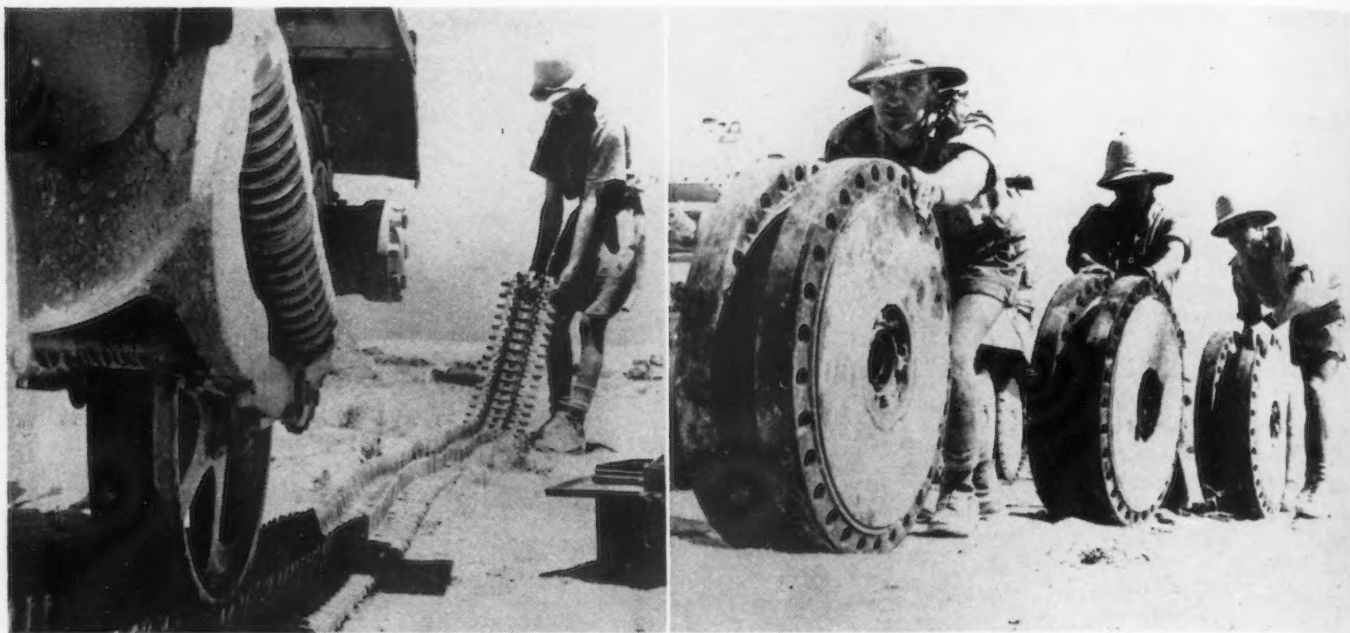
A 24-in. pipe line from the junction of the first two lines near Salem to be constructed to the so-called New York and Philadelphia areas, with branches to refining centers; distance to New York harbor about 1200 miles.

Necessary tank farms, tankage, pumping stations, and equipment to deliver an aggregate of 250,000 bbl. of oil daily to terminal points at Bayonne and Philadelphia.

Emergency Pipelines, Inc., would construct, operate, and maintain the following facilities:

A 22-in. pipe line originating at a point in the east Texas oil field and extending northeasterly to near Shreveport, where it will connect with the line to be constructed by National Defense Pipelines, Inc.; distance about 65 miles. This 1820-mile line will require approximately 450,000 tons of 7/16-in. plates if entirely welded. With the line will be auxiliary equipment, including about 60 1250-hp. motors for as many centrifugal pumps and 300 large valves, the latter calling for about 1000 tons of cast iron and steel.

The Plantation pipe line with lateral spurs will be 1261 miles long. Recently by a Presidential proclamation the line was declared to be necessary to national defense in order to obtain needed rights of way. The line, financed



DESERT REPAIRS: The track of a Bren gun carrier (left), is being taken off for repairs somewhere in Africa. At the right are the carrier's wheels being rolled toward a tank hospital.

by several oil companies, is already well under way. It starts at Baton Rouge, La., and runs north-easterly through Louisiana, Mississippi, Alabama, Georgia, South Carolina and into North Carolina to the vicinity of Greensboro. The project is designed to deliver daily 60,000 to 90,000 bbl. of petroleum products such as gasoline, kerosene, naphtha and Diesel oil. The line will consist of 435 miles of 12-in., 359 miles of 10-in., 214 miles of 6-in., and 253 miles of 4-in. pipe. There will be 14 pumping stations and 17 terminals. This pipe line took 180,000 tons of steel. The material was allocated to the National Tube Co., Jones & Laughlin Steel Corp., Republic Steel Corp., Spang, Chalfant & Co., and Youngstown Sheet & Tube Co.

The Southeastern 400-mile gasoline pipe line starts at Port St. Joe, Fla., on the Gulf of Mexico, and runs through Bainbridge, Albany, Macon, Americus and Atlanta, Ga., to Chattanooga, Tenn.

New Shell Loading Plant

Parsons, Kan.

••• **Johns-Manville Corp.**, New York, has completed a contract with the War Department to proceed at once with construction and operation of a \$27 million shell-loading plant near Parsons.

Ellwood City's Small Plants Band to Get Government Jobs

Ellwood City, Pa.

••• In order to obtain government contracts, which they feel are necessary if they are to survive, seven of the smaller industries of Ellwood City, Pa., have pooled their interests and will act as one large firm called the Ellwood Products Co. With the individual firms acting as departments in the Products company, they are equipped to turn out a variety of defense materials, from hospital tables to machine gun tripods. A representative of the group is presenting the new plan to defense officials in Washington and attempting to obtain contracts.

Members of the group are the United Tube Corp., Cavert Wire Co., Ellwood Co., Beaver Enameling Co., Ellwood City Iron & Wire, and Jones Engineering Co.

Viener Plant Completed

••• **Hyman Viener & Sons**, smelters and refiners of non-ferrous metals, have completed construction of their new metals plant at 5300 Hatcher Street, Fulton, Richmond, Va.

Lamson & Sessions Refunds Bonds, Other Loans

Cleveland

••• **Lamson & Sessions Co.**, large manufacturers of bolts, nuts, and cotter pins, has refunded its bonds, the balance of an RFC loan, and most of its current bank loans through the medium of a new \$800,000 five-year 3 per cent loan, maturing serially. Besides effecting a sizable interest saving, the refunding may pave the way for near term adjustment of the \$600,000 arrears on its 7 per cent preferred stock. The company has a large amount of defense work on hand and its plants are running at capacity.

New Ore Fleet Protested

Buffalo

••• **Independent ore vessel operators** on the Great Lakes may band together to protest the building of an emergency ore fleet of 25 vessels by the Maritime Commission. The smaller operators here fear they will be "frozen out" of the operation of boats during the emergency, and then, after the war, excess capacity resulting from the new construction will force them out of business. Local operators are meeting this week to draft a protest.

Shells Replace Soda Fountain Equipment, Auto Accessories

Cleveland

••• A \$2,096,000 contract for 105 mm. shells has been awarded to Bishop & Babcock Mfg. Co., makers of auto accessories and beer and soda fountain equipment. The company has entered other bids for shell work in an attempt to lessen its vulnerability to further mandatory curtailment of non-defense production.

FTC Charges Wire Makers' Violation of Anti-Trust Law

••• Alleging violation of the Clayton anti-trust act, the Federal Trade Commission has ordered the three largest manufacturers of steel wire or strap binding machines to cease and desist from carrying out "tying" contracts in the leasing of such machines and in the sale of steel wire or strapping. One of the orders was also directed against a fourth company owning the stock of one of the manufacturers.

Respondent companies, the FTC announced, are The Gerrard Co., Inc., manufacturer of wire tying machines or appliances, and American Steel & Wire Co., owner of practically all its capital stock; Signode Steel Strapping Co., manufacturer of strap and wire tying machines and appliances and of wire and strapping; and Acme Steel Co., manufacturer of tying tools, machines and appliances and of steel straps and bands.

Rustless Reports Half Year Profit of \$1,164,460

Baltimore

••• Rustless Iron & Steel Corp., reports a net profit after provisions for taxes of \$1,164,460 or \$2.62 per share of common stock, for the six-month period ending June 30. For the same period last year the net profit amounted to \$430,537.

Pehrson Takes Mines Post

••• Elmer W. Pehrson has been appointed Chief of the Economics and Statistics Branch, Bureau of Mines, Department of the Interior.

New Reference Book On Alloy Steels

••• An "Alloy Steel Reference Book," recently published for the first time by Joseph T. Ryerson & Son, Inc., clearly summarizes the technical aspects of the treatment and uses of alloy steels and contains practically all of the information necessary to specify and purchase alloy steels. The clear, comprehensive style in which the information is presented enables those without metallurgical or technical training to understand and apply the included information and essential data.

Steel structures, alloying elements, heat treating, testing, characteristics, quality, compositions, and definitions of many alloy steels are included in the book. Tables of standard technical information and a complete cross indexing of the book make it handy for quick reference to clear, understandable explanations of technical metallurgical problems. The book is a leather covered, ring binder loose leaf type.

NOT A PULLMAN: These are airplane tail cones made from aluminum alloy sheets at the Ryan Aeronautical Co. plant at San Diego, Cal.



Chromium Priority Control Clarified

Washington

••• Clarifications of the July 7 order subjecting chromium to industry-wide priority control have been issued by OPM's priorities division. The term "processor" is redefined in the order to mean "any person who uses ores or concentrates for the manufacture of, or converts them into chromium chemical, chromium refractories or metallurgical forms of chromium."

The revision also includes the latest definition of a "defense order," a provision requiring the acceptance of defense orders, a section for the relief of persons whose defense orders have been unreasonably rejected or deliveries deferred, and a provision to clarify restrictions on the use of chromium in making chemicals.

OPM Expert Sees 240,000-Ton Copper Shortage for 1941

••• The defense copper situation was characterized as one of increasing seriousness with a relatively stationary supply and growing demand by John Orchard, consultant, OPM Bureau of Research and Statistics, at a priorities clinic for the trade press last week. One thing that can be done, however, he said, is to insist in the scheduling of defense orders that copper not be taken until it is needed.

Supplies of copper for 1941 were placed at 1,650,000 net tons, divided as follows: Domestic production, 950,000 tons; Latin-American imports, 500,000 tons; other imports, 100,000 tons; passing through refineries, 100,000 tons.

The only prospect for an increase in 1942 was declared to be that of additional domestic production of 150,000 tons, which would mean a total supply of 1,800,000 tons.

Defense demand in 1941 under the present program was said to be about 600,000 tons. Maintenance of essential services will take another 400,000 tons, leaving a total of 650,000 or a shortage of 240,000 tons. For 1942, defense demands will be up to 1,000,000 tons while essential services will remain at 400,000 tons, making a shortage of 770,000 tons.

"Weapon Value" of U. S. Planes Gaining, British Expert Says

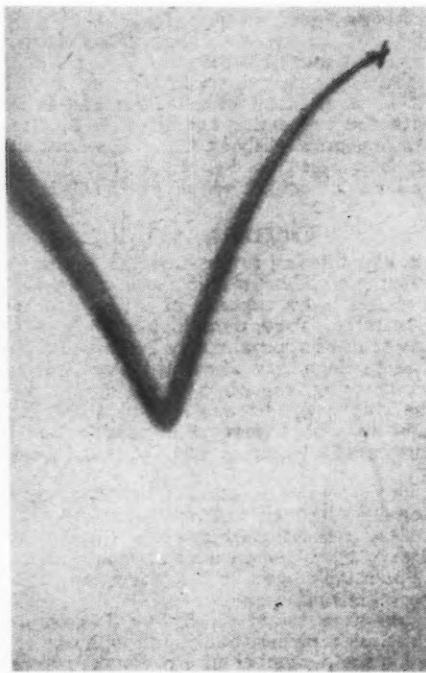
••• The "weapon value" of American airplanes being sent to Great Britain is increasing, according to C. G. Grey, British aviation authority. "Weapon value does not mean only bigger or better armament," says Mr. Grey. "It means the worth of the whole aeroplane as a fighting machine. Performance is no use without guns, nor guns without performance. Speed is no use without manoeuvrability. Fire power is useless if the fire cannot reach the enemy. Fire power plus performance is useless if the machine is poorly armored, or has an unreliable motor."

"Also, supplies of material from the U. S. A. are growing fast," Mr. Grey writes in a recent issue of *The Aeroplane*, one of the leading English aviation journals, "and the quality of the stuff is improving with the quantities. Fewer modifications are needed."

Mr. Grey credits Sir Hugh Dowding, British Air Chief Marshal, for much of this improvement. He quotes Sir Hugh as having said two years ago, "The rapidity with which Air Ministry scientists produce one invention on top of another is almost embarrassing at times, because the Air Staff can never standardize any arm of defensive detail, but must keep their methods fluid so as to incorporate each new device as it materializes."

"Sir Hugh's mental attitude in this matter probably explains why and how he got in so much good work in the United States," says Mr. Grey, "and why American aeroplanes and their equipment are being so quickly brought up to our ideas of modern requirements."

"And in the meantime the Germans are progressing, too," he adds. "We have been told that the Heinkel 113 was a wash-out. . . . Also the Messerschmitt 109F does not seem to come up to German expectations, judging by the number our people have shot down over France. But here again, we must not under-rate our enemies. Somewhere in a German back room there may be, in fact there



SKYWRITERS: Some RAF fliers are said to be leaving the V for victory in the skies over Germany and occupied France.

must be, a greater than Messerschmitt or Heinkel coming into his own."

"Naturally we cannot expect our friends abroad to believe that all our figures for shot-down enemy machines are accurate," he says. "They have had too much enemy propaganda pumped into them. So, when our R.A.F. sweeps over Northern France and claims to have shot down five enemy aircraft for each one we have lost—besides all the damage our bombers have done—they probably feel generous if they believe that losses have been equal, but that we are the winners by the amount of bombing we have done. I only ask them to look at their maps of France and see where our people have been, miles inland from the coast, in numbers and in full daylight, and then ask themselves whether we could have got there if our fighters had not been completely on top of the Germans."

Subway Gets B-1 Rating

Chicago

••• This city's \$60 million subway has been granted a B-1 priority rating, which is the highest civilian rating.

June Steel Exports Lowest in 14 Months

••• Exports of iron and steel products again dropped to reach their lowest point in 14 months when only 398,667 gross tons valued at \$35,213,412 were shipped in June, preliminary data released by the Department of Commerce reveal. Shipments in May, 1941, had amounted to 409,840 tons valued at \$35,346,239 and those of June, 1940, totaled 617,181 tons valued at \$38,771,792.

Shipments during the six months of 1941 totaled 3,016,668 tons valued at \$223,202,280 compared with shipments of 2,764,943 tons valued at \$195,682,417 during the corresponding period of 1940.

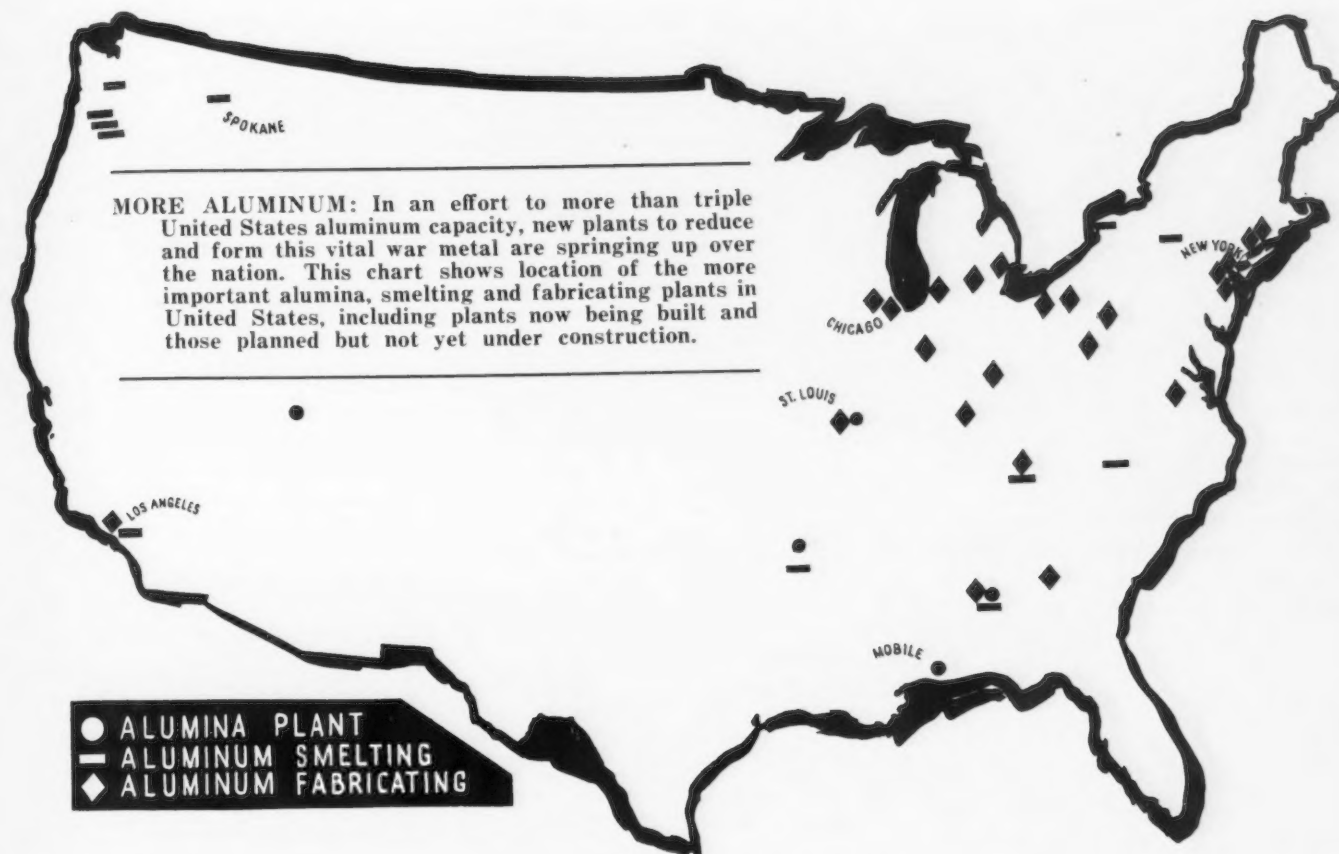
Non-alloy ingots, blooms, etc., comprised, in point of tonnage, the chief items exported, the 58,595 tons shipped in June closely paralleling the 58,900 tons shipped in May. Pig iron took second place, shipments of 35,402 tons in June running ahead of the 27,444 tons shipped in May. Other commodities important in the June export trade included alloy ingots, blooms, etc., 31,130 tons, non-alloy black steel sheets, 27,255 tons, and tin plate and taggers' tin, 23,700 tons.

At 59,018 gross tons valued at \$1,059,524, scrap exports in June declined slightly from the 62,894 tons valued at \$1,260,688 shipped in May of this year. Shipments in June, 1940, had amounted to 317,683 tons valued at \$5,251,031.

Cumulative exports for the first half of 1941 totaled only 415,880 gross tons valued at \$8,111,351 as compared with 1,478,806 tons valued at \$23,468,354 during the corresponding period of 1940.

T. C. & I. Enlarges Stack

••• The iron situation at Birmingham has been relieved from a production standpoint, with the Tennessee Coal, Iron & Railroad Co. blowing in its No. 2 furnace at Ensley Works and the Woodward Iron Co. blowing in its No. 3 furnace. The Tennessee company stack had been off since June 1 for rebuilding and enlarging and the Woodward furnace had been off about three weeks for repairs. The enlarging of the Tennessee company furnace has increased its capacity by 75,000 tons annually.



Aluminum Capacity To Be Increased 350%

...Driving to meet the astronomical demands of the defense program, the aluminum industry is being forced through an expansion unprecedented in American history. Announcement last week of plans to build a new alumina plant and three new smelting plants (see *THE IRON AGE*, Aug. 28, p. 88) were the latest steps in the race against time to expand the aluminum industry more than 350 per cent in two years.

The goal of the OPM, or at least the latest announced, is 1,500,000,000 lb. of aluminum a year. Currently production is at the rate of about 600,000,000 lb. annually. New plants, on which construction was begun in the early phases of the defense program, will shortly be coming into production and will zoom output from this point to the one billion-lb. goal to be reached some time in 1942, according to the OPM timetable. Increases after that point will be slower.

Paradoxically, while this tremendous expansion has been gath-

ering headway, the key unit of the effort, Aluminum Co. of America, has been forced to defend itself against charges by the Department of Justice of monopolistic practices. Arguments covering 56,700 pages have been presented thus far in the case. Technically the matter is closed and a decision is expected sometime this fall.

Whether forecasting the shape of things to come, or merely representing the byplay of the forces at work currently in the aluminum industry, the tumbling of aluminum prices over the past two years has been a confusing aspect of the aluminum situation.

In contrast with the generally rising trend shown in other commodity prices, aluminum has declined from 20c. a lb. in the pre-war era to 15c. at present, a drop of 25 per cent.

What prices will be after the war when the huge productive capacity now in building is freed of defense work and is again available for consumer goods is a matter still shrouded in confusion. Manufacturers, however, are not forgetting the comment made recently by the president of Reynolds Metal Co., a newcomer in the

aluminum production field, that aluminum can be made as cheap as 10c. a lb. In any event it is apparent that considerable reorganization of the channels of consumption of the various metals is due when competitive conditions return.

Ironically, the civilian consumer has as yet had no benefit from these price reductions. The defense program, which is taking 100 per cent of all aluminum output, has been the only beneficiary of this drop in quotations.

The cause of the aluminum expansion is obvious—the development of the airplane as a weapon. While the lion's share of aluminum is going into aircraft, the defense program calls for aluminum in many other fields, as in tanks, naval and army equipment, etc.

Close to 90 per cent of the weight of a military plane is aluminum. This in turn is roughly broken down into 45 per cent sheets, 17 per cent forgings, 15 per cent sand castings, 13 per cent extruded products, 3 per cent tubing, 3 per cent rods and bars, 2 per cent rivets and 2 per cent miscellaneous forms and paints.

The exact demands of the air-

craft industry for aluminum varies as the production emphasis varies from model to model. A training plane, on which emphasis was placed early in the defense program, uses comparatively little aluminum, but the heavy four-engined bomber, already looked upon as the tactical weapon of the future, takes close to 30,000 lb. of the light metal. In contrast to this figure, a Navy-dive bomber requires about 10,000 lb., a pursuit plane 5,000 lb. and a medium two-engined bomber 18,000 lb.

There are concentrations of aluminum plants in two areas, one in the Bonneville Dam district in the Northwest and the other in the TVA basin in the South. These concentrations are chiefly a reflection of the large quantities of electric energy required to smelt aluminum. Actually Alcoa is the largest industrial user of TVA and Bonneville hydroelectric power.

Coupled with the increase in alumina and smelting plants, has been an equally important but less spectacular expansion in aluminum fabricating facilities.

A suggestion of the magnitude of this fabricating expansion is given in the figures covering such extension to capacity of Alcoa.

Aluminum Drive Nets 1/2 lb. per House

Washington

• • • The largest collection of scrap per occupied dwelling was chalked up by Rhode Island during the recent nation-wide community collection of scrap aluminum. The Rhode Island collection of 204,000 lb. was equal to 1.088 lb. per dwelling, OPM reports. In second position was Utah with a total collection of 100,000 lb., equal to 0.716 lb. per dwelling. The average for the nation was around a half pound per house.

Largest total collection was in New York which reported 1,110,000 lb., followed by Massachusetts with 700,000 lb. and New Jersey with 600,000.

Comparing facilities which will be available in December of this year with capacities of December, 1939, the expansion has been roughly of the following order: forging capacity, 163 per cent; sheet rolling, 56 per cent; tubing, 157 per cent; rolled wire, rod, etc., 190 per cent; extrusion, 138 per cent, and sand castings, 218 per cent.

Somewhat overshadowed by the large public funds now being put

into new aluminum facilities is the fact that the Aluminum Co. of America last year began an expansion of facilities costing about \$200,000,000 before defense officials were able to clear away enough red tape to get their own plans moving. This independent action was undoubtedly a saving factor in meeting the sharp increase in airplane production in recent months.

Hidden somewhat by the cry for supplies is the fact that a large part of the aluminum industry is mortgaged or owned outright by the government. In the case of Alcoa alone, the government will own close to 45 per cent of the company's expected capacity in mid-1942. At that time the company expects to be producing about 1,100,000,000 lb. of aluminum, of which 760,000,000 lb. will be from plants wholly owned by Alcoa and 340,000,000 from government-owned plants.

Another phase of the government participation in the aluminum industry is the new companies that are being encouraged to enter the field. For example, Union Carbide & Carbon Co., Reynolds Metals Co., Bohn Aluminum & Brass Co. and the Olin Corp. are scheduled to operate smelting plants now under construction.

The larger alumina and smelting plants in operation currently are the Lister Hill plant of Reynolds Metals Co., with a capacity of 40,000,000 lb. a year and the five Alcoa units—Alcoa, Tenn. (164,512,530 lb.); Massena, N. Y. (142,003,223 lb.); Badin, N. C. (58,882,397 lb.); Niagara Falls, N. Y. (37,173,893 lb.), and Vancouver, Wash. (9,987,957 lb.).

In addition the following plants are under construction: Reynolds Metals Co., Lister Hill, Ala. (100,000,000 lb.); Union Carbon & Carbide Co., Spokane, Wash. (60,000,000 lb.); Bohn Aluminum & Brass Co., Los Angeles (70,000,000 lb.); Olin Corp., Tacoma, Wash. (30,000,000 lb.). In the latter plant, the possibility of utilizing the alumite process is being explored. These plants are in addition to the three smelting plants and one Alumina plant announced last week.

COMMUNITY ALUMINUM: Aluminum scrap collected in New York during the recent nation-wide community drive will be remelted in this 3000-lb. aluminum furnace at the plant of Alloys & Products Co., New York.



How to Get Defense Orders Outlined for Small Manufacturers

Chicago

•••To help desperate civilian manufacturers keep their doors open with defense business in these days of raw material scarcity, prime contractors, successful sub-contractors and the Chicago district offices of the Army Ordnance Department and of Defense Contract Service, have told THE IRON AGE the fruitful sales approach for obtaining these life-saving orders. The Defense Contract Service, seconded by the Ordnance Department, listed these suggestions:

1. Don't try to sell the government regular products. Government specifications can't be changed willy-nilly. Think in terms of combat materials for this is the government's language right now. Study the Ordnance Department's exhibit of defense products.

2. Don't stop soliciting after submitting the list of plant facilities. Too many firms are never heard from again. The Chicago office alone of D.C.S. receives 1700 inquiries a week. The aggressive firm keeps coming back and back—its visits are welcome.

3. Don't stop with calls on OPM, Army Ordnance and D.C.S. offices. Call regularly on holders of prime defense contracts.

4. Don't give long-winded sales talks. Present the facts concerning a plant's ability to switch over to defense briefly. Both offices have competent engineers who can quickly interpret how a shop can fit in the picture.

Defense Contract Service says a company should also: (1) follow closely D.C.S. bulletins describing available jobs, issued every three weeks to chambers of commerce or banks in every city and town; (2) get Form 31-5B from the nearest D.C.S. office, and list facilities thereon completely.

The other side of the picture and what is the biggest source of defense sub-contracts—the prime contractor—also has definite sug-



HEADS DOWN: Scenes like this will be common in many industrial cities and towns if the OPM has its way. It is subcontracting as it should be done. Around this table are executives and engineers of York, Pa., companies poring over plans for filling their \$2 million government order for 6-in. Barquette guns for harbor defense. From left to right (including those partly hidden) are: P. P. Stock and H. C. Bentzen, York Ice Machinery Corp.; Burwell B. Smith, S. Morgan Smith Co.; Warren C. Bulette, Brandt-Warner Mfg. Co.; William S. Shipley, board chairman, York Ice Machinery; Marshall G. Munce, York Ice; Beauchamp Smith and D. C. DeVine, S. Morgan Smith Co.; T. C. Cottrell, York Ice; M. L. Gotwalt, Road Machinery Co., and Edward Fisher, A. B. Farquhar Co.

gestions to offer. Such firms as Stewart-Warner, Pullman-Standard Car Mfg. Co., Guiberson-Diesel Engine Co., who have issued many sub-contracts so far and are definitely on the lookout for more, tell THE IRON AGE that the order seeker should:

1. Prepare a complete presentation of the company, including descriptions of manufacturing equipment, officials, floor space, personnel, normal work handled, etc. The prime contractor needs a picture of what a plant is and what it can do. Emphasize tolerances normally reached.

2. Appoint men to solicit defense business who can intelligently discuss the technical and engineering data.

3. If necessary, pool facilities with other firms nearby if facilities are inadequate to handle a complete order. This method has proved successful and practical.

Stewart-Warner, Guiberson, and Pullman-Standard, who are typical of big prime contractors, all stress the fact that they are looking for more sub-contractors. They are willing to cooperate even to the

point of furnishing raw materials, jigs, fixtures and other small tools, if the sub-contractor properly presents his basic equipment.

From firms who have already successfully obtained sub-contracts, in most cases making a switch from normal civilian production to defense work, helpful suggestions were also contributed. These companies included Noblitt Sparks Industries, Columbus, Ind., Just Mfg. Co., Chicago, Chicago Screw Co., Burgess-Norton Co., Geneva, Ill. Their tips can be boiled down to these:

1. Be aggressive. Keep the attitude that the government right now is the biggest sales prospect in the world, and go out after his business as wolfishly as in regular trade channels.

2. Put certain men on the trail of defense work to the exclusion of all other work.

3. Emphasize not only facilities, but personnel, history, credit and financial standing, and so forth.

4. Make personal calls.

Specifically, two companies related their methods, which can

easily be adapted successfully by others.

A sheet metal company normally producing sinks and food service products, and now making cargo vessel galley equipment and mine sweeper parts, prepared a sales presentation of the company which contained: (1) photos of plant and equipment; (2) list of equipment; (3) history of company, including officials, personnel, etc.; (4) list of outstanding installations; (5) reproductions of business paper articles describing the firm's methods. The official of this firm stated that use of publicity articles had proved very helpful. This company stressed the importance of getting the right presentation and then making enough personal calls to put it over.

Noblitt Sparks Industries who make Arvin radios and other civilian products which face a "blackout" due to lack of materials, have killed two birds with one stone. They are getting defense orders and they are utilizing their regular sales force, which otherwise would be spending the next year or two with its collective feet on the desk because of nothing to sell. Noblitt prepared a "picture book" giving photos of its plant and equipment, and photos of every metal part—notably stampings and tubings—which it normally makes. This book has been placed in the hands of the regular sales force, each salesman working his regular territory. Only now his calls are on the government defense offices and on companies holding prime defense contracts. Already Noblitt has obtained orders with prospects of more to come, and sales morale is high again.

Essentially, government offices, prime contractors and those who have obtained sub-contracts all agree on the fundamentals required of firms seeking defense business: State the facilities and abilities of the plant completely and briefly; know what the plant can do; use regular business contacts to the full; make enough calls in person.

As the president of one successful Illinois sub-contractor said: "There's no reason why any company should be without defense business—but a firm has to 'drive' as hard for defense as it did for regular sales in peace time."

July 1 Scrap Stocks Show 10% Decline

Washington

• • • Representing a decline of 10 per cent from 7,235,000 tons at the end of March, domestic stocks of iron and steel scrap at consumers' and suppliers' plants and in transit at the end of June approximated 6,529,000 tons, according to the Bureau of Mines.

Pig iron stocks at the end of the second quarter totaled 1,834,000 tons, a drop of about 30 per cent under stocks of 2,608,000 tons on hand at the end of the first quarter.

Known scrap stocks held by consumers and suppliers at the end of the second quarter were equivalent to a five-weeks' supply at the rate of consumption during the quarter, a position slightly lower than that at the end of the first three months. Although total stocks decreased 10 per cent, those on hand at and in transit to consumers' plants declined only 3 per cent or from 5,220,000 tons on March 31 to 5,051,000 tons at the end of June. However, suppliers' stocks declined from 2,015,000 tons

at the end of March to 1,478,000 tons on June 30, or a decrease of 27 per cent.

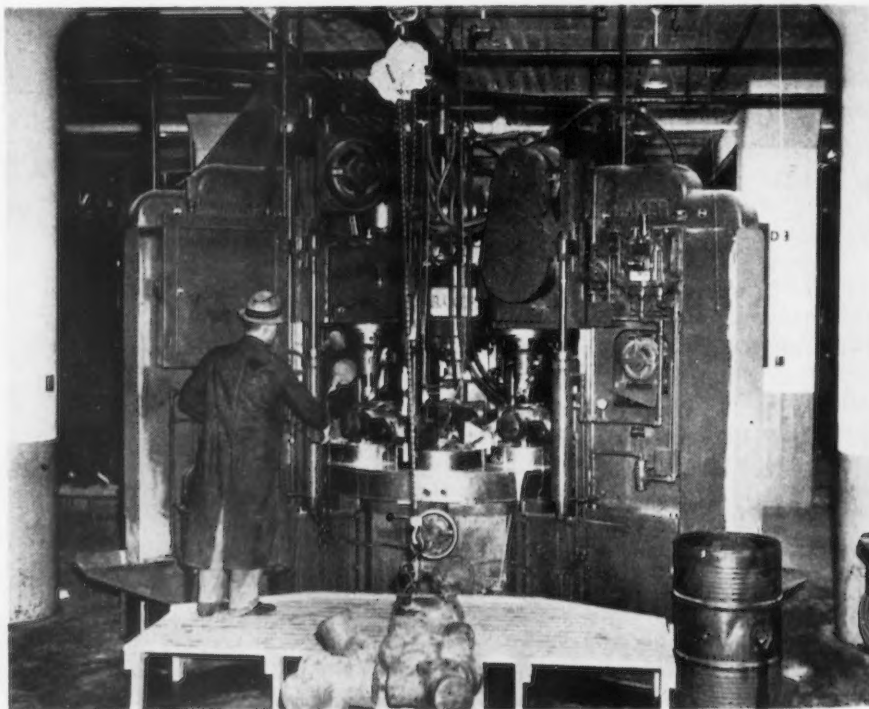
The total consumption of ferrous materials (scrap and pig iron) amounted to 29,305,000 net tons during the second quarter, an increase of 3 per cent over the 28,423,000 tons used in the first three months of the year. This increase was occasioned by gains of 10 per cent in the use of purchased scrap and 3 per cent in home scrap, while pig iron consumption decreased only 0.1 per cent. Despite the relative use of purchased scrap, stocks of purchased scrap on hand at and in transit to consumers' plants decreased only 1 per cent.

New Tungsten Mines Produce 150 Tons of Ore a Day

Deadwood, S. D.

• • • Newly opened mines here are producing close to 150 tons of high tungsten content ore daily. Mines are within the Deadwood city limits and comprise a tract of 200 acres, a consolidation of several old claims. Gilt Edge Mines, Inc., is conducting operations.

MACHINING PROPELLER HUB FORGINGS: The special heavy duty vertical Baker drilling machine shown here, machining five hub forgings in the new Indianapolis plant of the Curtiss-Wright Corp.'s propeller division, is an example of the latest type of machines used in this factory. In this (old Marmon) plant are being manufactured hubs, hub nuts, blade gears, adapter plates, brush housings and many other propeller parts.



Steel Profits Up 1% As Operations Rose 9%

••• Reflecting higher operating costs during the first half of 1941 the total net earnings of 80 steel producing companies representing more than 90 per cent of the industry's steel making capacity, were only one per cent above the earnings of the last half of 1940, despite the fact that production rose nine per cent to near capacity volume.

Earnings totaled \$174,105,000 after all charges were deducted, but before dividends were shown by these companies during the first six months, showing less than 8.9 per cent profit on investment, while operations averaged 98 per cent of capacity. Approximately the same group of companies, operating at 92 per cent during the last half of 1940, earned nearly \$172,000,000, representing an annual rate of 9.3 per cent on investment.

While there has been no advance in the average price of steel products, wages, taxes and raw materials costs have been substantially higher in 1941 than in the year before. Taxes are estimated to have risen from 22c. to 29c. per dollar of total payroll while dividends have fallen from 11c. per payroll dollar during the last half of 1940 to 10c. per payroll dollar during the first half of this year.

Republic Pays 50c. Dividend

••• At a meeting of directors of Republic Steel Corp. Aug. 19, a dividend of \$1.50 per share on the 6 per cent cumulative convertible prior preference stock Series A, and a dividend of \$1.50 per share on the 6 per cent cumulative convertible preferred stock were declared, payable Oct. 1. A dividend of 50 cents per share was declared on the common stock, payable Oct. 2 to stock of record Sept. 10.

Grants Meehanite Licenses

••• Meehanite Metal Corp. announces that manufacturing rights for Meehanite castings have been granted to Cooper Engineering Limited, Bombay, India, and the Globe Engineering Works, Capetown, South Africa.

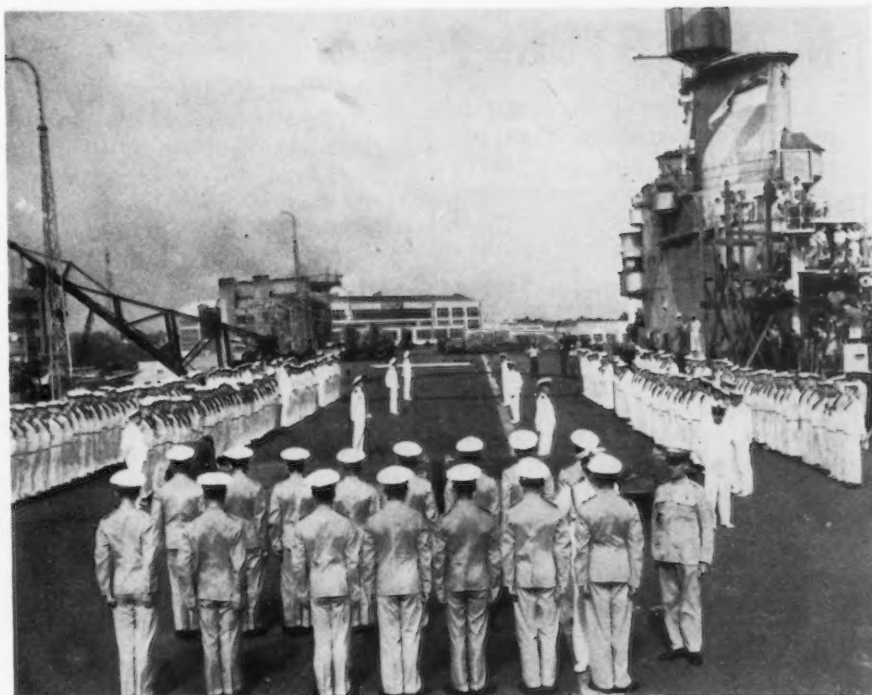


Photo by Wide World

ILLUSTRIOUS IN NORFOLK: Shown above is a view from the stern of the British aircraft carrier *Illustrious* (a ship several times reported as sunk), which is being repaired at Norfolk, Va. Steel needed for such repairs puts still another strain on production in the United States.

A. S. & R. Reports Half Year Profit of \$6,768,817

••• American Smelting & Refining Co., New York, reports a net profit for the first half of 1941 of \$6,768,817, amounting to \$2.29 per share on the common stock after allowing for the first half year's dividend requirement for the preferred stock. A net profit of \$6,405,919 was earned during the same six-month period of 1940.

••• American Locomotive Co. and subsidiaries, report a net profit for the six months ended June 30 of \$2,141,519, after provisions for United States and foreign income taxes have been deducted.

••• Packard Motor Car Co., Detroit, for the six months ended June 30, reports a net profit of \$1,251,694, against a net loss of \$102,366 in the first half of 1940.

••• Divco Twin Truck Co., Detroit, and subsidiaries report for the nine months ending July 31, 1941, a net profit of \$379,251. This compares with a net profit of \$257,592 for the nine months ended July 31, 1940.

Pontiac Apprentice School Operates on Two Shifts

Pontiac, Mich.

••• For what is believed to be the first time in the automobile industry, an apprentice school is operating on two shifts. According to Fred A. Voelker, supervisor of the school operated by Pontiac Motor Division, twenty-one boys—mostly the sons of Pontiac employees—have been added to the school's course since the first of the year, and a second shift has been formed to allow the advanced students to work on assignment for actual defense production. As in the factory, the second shift of students reports at 3:30 P.M. and works until midnight.

Struck Car Plant Resumes

Birmingham

••• With the Steel Workers Organizing Committee local voting to abide by a proposal of the National Defense Mediation Board, operations were resumed Aug. 25 at the struck Bessemer plant of the Pullman-Standard Car Mfg. Co.

DO YOU NEED MORE STEEL?

One way for steel users to protect their sources of supply is to conserve and ship every pound of iron and steel scrap. More steel can be produced if more scrap is made available.

At an average operation of 100 per cent of capacity, the steel industry of the United States can produce approximately 86,000,000 net tons of ingots a year. At 95 per cent there is a loss of more than 4,300,000 tons annually. If scrap shortages should become so serious as to force the steel industry to a 90 per cent operation, the annual loss of steel ingot production would be 8,600,000 tons.

Under such circumstances it behooves every user of steel, in his own interest and in the interest of National Defense, to conserve his scrap and ship it as soon as possible whether the quantity is small or large. Less than carload lots should be sold to your local dealer.

This company have been specialists in iron and steel scrap for 40 years, serving the Atlantic Seaboard and the Pittsburgh district through our offices in Philadelphia, Pittsburgh and Worcester. We are anxious to do our utmost in cooperating with steel consumers in the prompt disposal of their scrap and with the Government agencies in the procurement of a sufficient supply to maintain steel production at the highest possible level.

If you have any problem in connection with the disposal of your scrap, we shall be glad to place our experience and facilities at your service without obligation.

We invite your inquiries.

THE CHARLES DREIFUS COMPANY

Philadelphia	Pittsburgh	Worcester, Mass.
Widener Bldg.	Oliver Bldg.	Park Bldg.
Rittenhouse 7750	Atlantic 1856	6-2535

406 Potential Executives Complete G-M Courses

Flint, Mich.

• • • General Motors Institute, the school where General Motors Corp. trains many of its future executives, held its fourteenth graduation exercises on Aug. 22. C. E. Wilson, General Motors president, Arnold Lenz, president of the Institute's board of regents and assistant general manufacturing manager of Chevrolet Motor Division, and Albert Sobey, director, officiated. Of this year's class of 406 students, 301 completed plant cooperative courses in engineering, and 105 finished dealer cooperative programs. Fifty-five 1931 graduates of the Institute, who have risen to executive posts with the corporation, were awarded 10-year keys.

Wah Chang Trading Co. Gets Necessity Certificates

Washington

• • • The proposed purchase of additional machinery and equipment to increase production of tungsten and antimony in Foreign Trade Zone No. 1, Stapleton, Staten Island, has been approved by the Office of Emergency Management in a certificate of necessity issued to the Wah Chang Trading Co.

The petitioner, according to information released by the Foreign Trade Zones Board, began operations in Zone No. 1 in December, 1940, and since has processed several million dollars worth of critical materials. Commodities handled in the zone during the past year include industrial machinery valued at \$19,951,069; copper at \$16,353,964; airplanes, \$14,328,656; tungsten, ore and concentrates, \$7,420,278; and motor trucks, \$4,372,550.

Improvements in the zone during the year included the establishment of a fully equipped plant for processing Chinese tungsten ore, which heretofore was processed in Europe before being sent to the United States. The annual report of the foreign trade zone at Stapleton said that other ores may also be processed since it is possible to sample, treat, grade, mix and transfer from bags to drums within the zone with great ease and freedom from many customs regulations.

Coming Events

- Sept. 4 to 6—National Association of Fan Manufacturers, summer meeting, Hershey, Pa.
- Sept. 5 and 6—The American Ceramics Society, Refractories Division, Autumn Meeting, Granville, Ohio.
- Sept. 8 to 12—American Chemical Society, Atlantic City, N. J.
- Sept. 17 to 19—National Industrial Advertisers Conference, Toronto.
- Sept. 18 to 20—Concrete Reinforcing Steel Institute, annual meeting, Colorado Springs.
- Sept. 23 to 26—Association of Iron and Steel Engineers, annual exhibition and meeting, Cleveland.
- Sept. 25 and 26—Society of Automotive Engineers, National Tractor Meeting, Milwaukee, Wis.
- Sept. 25 and 26—Powdered Metallurgy Conference, annual meeting, Cambridge, Mass.
- Sept. 29 to Oct. 2—American Mining Congress-Metal Show, San Francisco.
- Oct. 1 to 4—Electrochemical Society, Fall Meeting, Chicago.
- Oct. 2 and 3—American Hot Dip Galvanizers Ass'n., Inc., Semi-annual Meeting, Netherland Plaza Hotel, Cincinnati.
- Oct. 6 to 10—National Safety Congress and Exposition, Chicago.
- Oct. 8 to 10—Porcelain Enamel Institute, annual forum, Chicago.
- Oct. 14 to 16—American Railway Bridge and Building Ass'n., Chicago.
- Oct. 14 to 17—American Institute of Steel Construction, annual convention, New York.
- Oct. 16 to 18—American Society of Tool Engineers, semi-annual meeting, Toronto.
- Oct. 19 to 24—American Welding Society, annual meeting, Philadelphia.
- Oct. 20 to 22—American Gear Manufacturers' Ass'n., Semi-annual Convention, Edgewater Beach Hotel, Chicago.
- Oct. 20 to 22—American Gas Association, Atlantic City, N. J.
- Oct. 20 to 24—National Metal Congress, Philadelphia.
- Oct. 23 and 24—Society of Automotive Engineers, Tulsa, Okla.

Scully, Canadian Steel Controller, Resigns

Ottawa

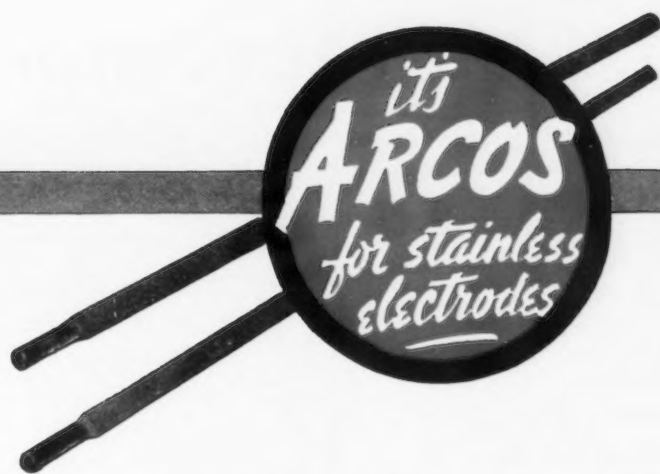
• • • The resignation of H. D. Scully, as Steel Controller and chairman of the Wartime Industries Control Board, has been announced by C. D. Howe, Minister of Munitions and Supply. He will be succeeded by F. B. Kilbourn, M. E. I. C., vice-president and director of the Canada Cement Co., Ltd.



THE LONG VIEW

Year in and year out you can depend on Arcos electrodes in all applications where stainless electrodes are used. Be sure, stick to Arcos.

ARCOS CORPORATION
401 N. Broad St., Phila., Pa.



"QUALITY WELD METAL EASILY DEPOSITED"

Distributors Warehouse Stocks in the Following Cities:

ATLANTA, GA.	J. M. Tull Metal & Supply Co.
BUFFALO, N. Y.	Root, Neal & Co.
BORGER, TEXAS	Hart Industrial Supply Co.
BOSTON, MASS. (Belmont)	H. Boker & Co., Inc.; W. E. Fluke
CHICAGO, ILL.	Machinery & Welder Corp.
CINCINNATI, OHIO	Williams & Co., Inc.
CLEVELAND, OHIO	Williams & Co., Inc.
COLUMBUS, OHIO	Williams & Co., Inc.
DETROIT, MICHIGAN	C. E. Phillips & Co., Inc.
ERIE, PENNA.	Boyd Welding Co.
FT. WAYNE, IND.	Wayne Welding Supply Co., Inc.
HONOLULU, HAWAII	Hawaiian Gas Products, Ltd.
HOUSTON, TEXAS	Champion Rivet Co. of Texas
KANSAS CITY, MO.	Welders Supply & Repair Co.

KINGSPORT, TENN.	Slip-Not Belting Corp.
LOS ANGELES, CALIF.	Ducommun Metals & Supply Co.
MILWAUKEE, WIS.	Machinery & Welder Corp.
MOLINE, ILL.	Machinery & Welder Corp.
NEW YORK, N. Y.	H. Boker & Co., Inc.
OKLAHOMA CITY, OKLA.	Hart Industrial Supply Co.
PAMPA, TEXAS	Hart Industrial Supply Co.
PITTSBURGH, PA.	Williams & Co., Inc.
PORTLAND, OREGON	Industrial Specialties Co.
ROCHESTER, N. Y.	Welding Supply Co.
SAN FRANCISCO, CALIF.	Ducommun Metals & Supply Co.
SEATTLE, WASH.	H. A. Cheever Co.
ST. LOUIS, MO.	Machinery & Welder Corp.
SYRACUSE, N. Y.	Welding Supply Co.
TOLEDO, OHIO	Williams & Co., Inc.

Effects of "Bunching" Of Defense Demands Shown by OPM Aide

Washington

•••The effect of concentrated demand for defense steel was pointedly sketched in both serious and jesting vein by Stanley B. Adams, executive consultant of the OPM branch of the Iron and Steel Unit, at the press "clinic" on priorities here last week.

It is because of the simultaneous pressure by different defense sources for tonnage that complaints are made of a shortage of both pig iron and steel. Mr. Adams declared that there is definitely a shortage of the blast furnace product and that steel demand is greater than productive capacity.

Giving a colorful explanation of the situation, Mr. Adams stated that while defense demands do not take over 35 per cent of the steel

capacity the material is wanted by specific types, but "as you fill up these lines they hog the ingots." Humorously, he said that it can be seen that "our problem is a simple one."

"All we have to do," said Mr. Adams, "is to give all the plates we can make in a month to the Navy, all of them to the Maritime Commission, all of them to the railroads and all of them to the pipe lines. All of these groups need the plates and we have not got them."

Mr. Adams had said that the annual plate capacity is around 6,000,000 tons and that the Army, Navy, Maritime Commission, the lend-lease program, and the railroads require better than 90 per cent of the monthly output of 500,000 tons. He remarked that "now come along the pipe line needs for 430,000 tons of 22-in. and 24-in. pipe. (The office of the Petroleum Coordinator estimates these requirements at 450,000 tons.)"

Mr. Adams said that only two

companies can make these sizes of pipe, one a producer of seamless and the other a maker of welded sections. He pointed out that if 28,000 to 29,000 tons of pipe are scheduled weekly it would take 14 weeks to produce this tonnage alone, but that one of those companies would need 300,000 tons of plates or 18 per cent of the total plate output during that period. He suggested that the situation might be relieved, however, by scheduling more of the pipe requirements with the seamless producer whose raw product is the billet. Superimposing the 18 per cent of the plate capacity for pipe on the 90 per cent for the other purposes, Mr. Adams said, means about 110 per cent of capacity.

Asked about the wire situation, Mr. Adams replied that the total priority load on the wire industry is only 4 to 5 per cent of its capacity and that it has the problem of being left alone to work the proposition out.


SO YOU WON'T HAVE

Wire-less PRODUCTION DAYS -

- If you are having difficulty getting delivery on steel wire—tell it frankly to Johnson Steel & Wire at Worcester, Akron or Los Angeles, and we'll try to help you.

We have stepped up production so that wire pulling on your part is not necessary. The kind of wire pulling that counts with us is the wire that is pulled through dies.

We feel sure we can be of service to you in all types of steel wire.



Three Generations
of Wire Drawing
Experience Offer
you Round and
Shaped Wire for
Manufacturing
Purposes.

JOHNSON STEEL & WIRE COMPANY, INC.

P. O. BOX 1211—MAIN OFFICE & PLANT
BRANCH PLANTS AND WAREHOUSES



WORCESTER, MASSACHUSETTS
AKRON, OHIO • LOS ANGELES, CALIF.

OPM Puts Teeth in Its Priority Actions

Washington

••• The OPM priorities division, acting to put enforcement teeth into all existing and future priorities actions, has broadened the scope of all priorities orders issued to date by issuing a new basic document—Priorities Regulation No. 1.

The requirement that acceptance of a defense order is mandatory, included for the first time in the pig iron priority order of Aug. 1 and repeated in the steel priority order of Aug. 10, will be a part of all future priority actions, according to the regulations embodied in the document.

Subject to a few specific limitations, all manufacturers and producers will be required in OPM priority actions to accept defense orders even if acceptance will prevent, or delay, deliveries on non-defense orders or defense orders with lower preference ratings. In addition to the defense order requirement, the new regulation lays down a general framework for priorities compliance, a formula similar to that outlined in the Aug. 1 order subjecting pig iron to mandatory priority control. The formula contained in the regulations is applicable to all manufacturers, producers, distributors and dealers, in whatever category.

Edward R. Stettinius, Jr., former director of priorities, explained that future orders issued by his division will merely cite Regulation No. 1 without repeating the full text of the regulation but that, where there is a conflict between its general provisions and the specific provisions of any existing or future order, the existing or future order will control. In the absence of any conflict, Regulation No. 1 will always be applicable to any priorities order.

Summarizing its major provisions, OPM said the new regulations include:

1. A system under which any defense customer for any material who is unable to place his order satisfactorily, or whose delivery is delayed, may bring the matter formally before the Director of Priorities who will take appropriate action.

2. A provision empowering the

director to assign preference ratings to orders which have been placed or which have not been placed, or to issue binding instructions regarding deliveries without assigning preference ratings.

3. A requirement that any person with a defense order on hand to so schedule his production that deliveries under defense orders will be made on the dates required.

4. A stipulation that delivery dates specified in defense orders must not be earlier than required.

5. Authority for the director in allocating material to do so without regard to preference ratings which may have been assigned to deliveries under particular contracts or purchases. In such cases specific allocations will take precedence over individual preference rating certificates or blanket ratings.

6. A requirement that intra-company deliveries, except when otherwise specified, are to be subject to the same restrictions which may apply to inter-company deliveries.

7. A prohibition against accumulation of excess inventory.

8. A stipulation that all records called for by priority orders are to be open to audit and inspection by OPM agents.

9. The power to deprive any person making willful false statements from deliveries of material and to recommend prosecution under section 35 of the United States Criminal Code.

273 Electric Trucks Ordered in July

••• July bookings of electric industrial trucks continued at about the same level as June orders, the Industrial Truck Statistical Association, 208 South LaSalle Street, Chicago, reports. July bookings totaled 273 units as compared with 287 units in June.

Total net value of chassis only during July was \$1,059,093, showing an increase of \$111,088 over the previous month, when the total value of chassis only was \$948,005.

July orders included 15 non-elevating platform trucks valued at \$39,670; 273 cantilever trucks valued at \$791,855; 11 light and heavy duty trucks valued at \$17,515; 41 crane trucks valued at \$206,093 and one special truck valued at \$3960.

25 Illinois Plants in 15 Cities Face Shutdowns

Chicago

••• Defense priorities and materials shortage threaten the jobs of over one-third of the workers in 25 plants located in 15 cities in this state, according to Martin P. Durkin, Illinois labor director. Durkin reported that these firms employ normally 3400 and that they anticipate the necessity of laying off 1284. Firms affected manufacture products requiring copper, brass, chrome steel, aluminum, white metal, rubber, plating supplies, etc.

Nine Meetings Scheduled On Welding in Defense

Detroit

••• Importance of welding in the national defense program will be emphasized during the 1941-42 season of the Detroit Section, American Welding Society. Nine meetings are scheduled for the year starting with one of Sept. 5 by Dr. A. V. DeForest, of Massachusetts Institute of Technology, who will speak on "Magnaflux Inspection." Other meetings already scheduled are Oct. 3, "The Welding of Aluminum," by G. O. Hoglund of the Aluminum Co. of America; Nov. 7, Dr. W. G. Theisinger, Lukens Steel Co., on "Heat and Mechanical Stresses in Welding." The meeting of Dec. 5 is scheduled to be an "Information Please" type of meeting, with a group of experts on hand to take care of questions.

10 Illinois Plants Pool Facilities for Defense Work

Decatur, Ill.

••• Ten local companies have pooled resources to obtain and produce defense contracts on a community basis. United States Mfg. Co., Wagner Malleable, Chamber Co., Behring Co., Quinlan Co., Fairies Mfg. Co., A. W. Cash Co., A. W. Cash Valve Co., Decatur Pump Co. and William Sealing Co. are in the group. One company will obtain defense work and parcel it out to other members of the pool.



STACKING BOXES and STACK-UNITS



WHEN PRODUCTION NEEDS 7-LEAGUE BOOTS!



It's time to look around for time-saving methods! Every lost minute affects the production schedule. Many concerns are saving valuable time in the handling and storing of small parts with A-S-E Stack-Units and Stacking Boxes. They're a real aid to defense speed on assembly lines . . . in stock rooms . . . in inter-departmental

handling . . . in many parts of the plant.

A-S-E STACKING BOXES

Give faster and more economical inter-plant or departmental handling of small parts. Rigidly constructed, they are able to withstand rough use and hard wear. They can be used on any type of conveying system. Boxes cannot telescope. Made in many sizes and gauges to fill definite production needs.

A-S-E STACK-UNITS

Have sloping bin front that saves time on assembly line. Parts are kept readily accessible without unstacking. And not only can Stack-Units be stacked high but they can be stacked interchangeably with boxes of same size. There's no tipping, toppling or telescoping from vibration or ordinary impact—once stacked they stay stacked.



Stacking boxes are made to meet any requirement. Write today for the facts on this time- and money-saving equipment.

ALL-STEEL-EQUIP COMPANY, Inc.
702 JOHN STREET
AURORA • ILLINOIS

Agree on Status of Married Women Working in Tin Mill Gary, Ind.

• • • Problem of status of married women working in tin mill finishing and black plate departments of Carnegie-Illinois Steel Corp. plant, here, has been defined in a supplemental agreement between management and SWOC.

The new policy provides that girls hired after May 1, 1940, who marry, may work 30 days before discharge. Girls hired prior to May 1, 1940, who marry may remain on the job two months for each year of service, providing they have been with the company five years or more. Those hired before May 1, 1940, but not employed five years, may work one month for each year of service. Women hired before May 1, 1940, and married previous to that date are protected by the seniority clause of the general agreement signed April 1, 1941; these women are not subject to discharge, save in a general layoff.

Mansfield, Ohio, Has \$2,500,000 in Defense Orders

Mansfield, Ohio

• • • A survey just completed by the Chamber of Commerce shows 13,123 men and women at work in Mansfield industries today, with 1641 of the total number working directly on defense orders. Hundreds more are working indirectly for the defense program, it was pointed out. Government work already completed and in process is estimated at \$2,500,000.

Regional Foundry Meeting To Be Held at Purdue

• • • A regional foundry conference will be held at Purdue University, West Lafayette, Ind., Oct. 17-18, under sponsorship of the Chicago, Michigan and Central Indiana chapters of the American Foundrymen's association in co-operation with the engineering extension department of the university.

A program is being arranged to appeal to foundry managers, supervisors, metallurgists, foremen, shopmen and others in the Indiana-Illinois territory, and will

Steel Wage 99.1c. An Hour During July

• • • About 10,000 additional steel plant employees went to work in July, bringing the total employment in the industry to a new peak of 648,000. Steel employment in June averaged 638,000, while in July, 1940, the industry employed an average of 549,000 employees.

Payrolls of the steel industry totaled \$114,059,000 during July, compared with \$110,504,000 in June and \$82,215,000 in July a year ago.

Wage-earning employees earned an average of 99.1c. per hour in July, as against 99.2c. in June and 85.6c. in July, 1940.

An average of 37.8 hr. per week was worked by wage earners in July, compared with 38.2 hr. per week in June and 36.5 hr. per week in July of last year.

be geared to foundry practice as influenced by national defense, particularly the heavy demand for castings and the serious shortage of raw materials. J. D. Burlie, foundry engineer, Western Electric Co., Chicago, is chairman of the general conference committee; and R. L. McIlvaine, foundry engineer, National Engineering Co., Chicago, is vice-chairman.

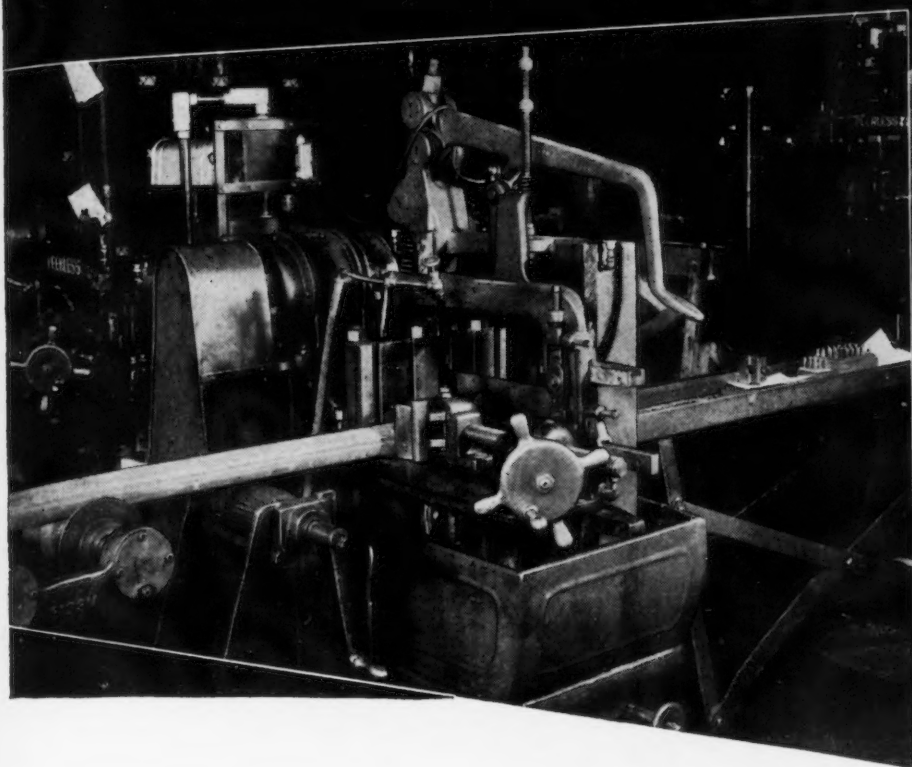
Pig Iron Consumers Warned To File Inventory Forms

• • • Failure to receive a number of reports has prompted the OPM Division of Priorities to serve notice on pig iron consumers that those who have not filed required inventory reports on Form PD-70 must do so immediately. Under the terms of the pig iron order, consumers of the metal were required to file inventory reports by Aug. 15.

"Information given by consumers on Form PD-70 is necessary for administration of the order," the division notice said. "This form must be filed each month by consumers whether or not the consumers are buying pig iron for that month.

"Under the terms of the pig iron order, the Division of Priorities is empowered to take appropriate action to require compliance by those who do not turn in their required reports."

**"GIVE ME A PEERLESS AND
I'LL CUT ENOUGH STUFF
TO FILL THE FORGE SHOP!"**



**PERFORMANCE
REPORT "K"**

A 6" x 6" Universal Type
Cut — 99.4% Pure Cop-
per, 4-7/16" Diameter
... Area 15.47 Sq. In. in
3.8 Minutes ... Blade
Traveling 125 Strokes Per
Minute ... Feed 325 Lbs.
... Coolant, Kerosene.

*Name on request.

**... AND SAWING IS THE SAFEST
WAY OF CUTTING METAL FAST!**

Production men know they can depend on Peerless to help them meet heavy work schedules—to speed up metal cutting the safe, accurate way—by sawing—and to release men for machining, forging, drilling and assembly operations . . . Peerless is the only Saw which is equipped with a Four-Sided Saw Frame—the frame that completely surrounds the blade and the work. This holds the blade with a tension and rigidity never before possible—prevents bowing . . . permits blade to lift and clear on every return stroke . . . and thereby lengthens blade life. Peerless is the only Saw fully controlled hydraulically . . . We shall gladly submit cutting-time estimates for your own regular or special types of metal sawing.

PEERLESS MACHINE COMPANY • RACINE, WISCONSIN



FAST, ACCURATE CUTTING DEMANDS POSITIVE BLADE CONTROL

PEERLESS MACHINE COMPANY, Dept. IA-941, Racine, Wisconsin

Mail cutting time estimate for.....

- ☐ Mail catalog on Hydraulic type Saw for High Production Cutting
- ☐ Mail catalog covering Vertical type used for Die Block Work
- ☐ Mail catalog on Mechanical type Saw for production cutting
- ☐ Mail catalog on general utility and maintenance Saws

Company.....

Individual.....

Street.....

City..... State.....

Warehouse Operators Hope For Quick Relief on Stocks

Cleveland

••• Momentary action is expected from defense officials to relieve the plight of warehousemen, and thus solve small bottlenecks that have cropped up periodically due to dislocation of warehouse

stocks. The condition of the order books at steel plants prevents any worthwhile runs for stocking purposes, and this situation might mean interruption of schedules to fill small defense orders unless the condition of warehouses is rectified.

Some observers are of the opinion that defense authorities may soon find it advisable to allot specific tonnages to warehouses.

Steel Workers Give Up Vacations for Bonuses

••• To help maintain the production of steel on a 24-hr. day and 7-day week basis, many steel companies have offered cash payments to production employees instead of regular vacations this year, according to a survey by the American Iron and Steel Institute.

Of 36 companies whose vacation plans were analyzed, 22 companies have permitted or have required cash bonuses to replace vacations with pay. Vacation plans of the other 14 companies specify that employees take time off from their jobs.

In the group of 22 companies, six companies have given their employees the choice of accepting a cash bonus or a vacation. Eleven companies have reserved to the management the right to require any employee to accept the alternative cash bonus. Five companies have required the acceptance of such a bonus by employees.

In one company, where the question was submitted to a vote of all employees, 83 per cent voted this year to accept a cash bonus in lieu of a vacation, thus cooperating with the management in the defense program.

Frozen Rolling Schedules Needed to Avoid Steel Loss

Chicago

••• An absolutely "frozen" rolling schedule of four weeks on some mills, followed by a second four weeks in which rolling changes could be ordered only by OPM directly, is the recommendation steelmen in this district are making for easing the extraordinary schedule pressure imposed by the priority order.

The difficult scheduling problem involved in bars and sheets where so many manufacturing classifications exist—16 in sheets alone—threatens a serious loss of production unless a rigid schedule is permitted the mills. Since the most economical rolling schedule for mills is based generally on a 13-week cycle, the eight-week cycle suggested would be considerably shorter for defense and yet give the mills a better break than they are getting at present.

ARMSTRONG



This ARMSTRONG BORING TOOL HOLDER is designed for small diameter work

The lightest of the 4 boring and inside threading tools in the Armstrong System of Tool Holders. It is an extremely handy tool for small diameter boring, threading brass turning and other light, accurate work, because (1st) while it has an offset shank, it is at the same time reversible—can be used as right hand or left hand tool, as desired, by simply swinging the yoke over the end of the shank. As either a right or left hand tool, these tool holders take small diameter bars (from 3/16" up) or standard square cutter bits. A floating gib (patented) in the yoke gives an extremely wide bearing on bar or cutter, increases rigidity and prevents chattering. The Boring Bars are of the best high speed steel, properly hardened, tempered and ground, ready for use. Each ARMSTRONG Light Boring Tool Holder comes with two High Speed Boring Bars, one High Speed Cutter and a drop forged Wrench—ready for work, 5 sizes of bars from 3/16" to 7/16". For heavier work, check the heavier boring tools described in the ARMSTRONG C-39 Catalog.

ARMSTRONG BROS. TOOL CO.

"THE TOOL HOLDER PEOPLE"

309 N. FRANCISCO AVE.

CHICAGO, U. S. A.

Eastern Warehouse & Sales: 199 Lafayette St., New York, N. Y.



ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

Curtiss Propeller Plants Negotiate Wage Increases

Clifton, N. J.

••• Independent union officials of Propeller-Craft, Inc., of the Curtiss Propeller Division, subsidiary of Curtiss-Wright Corp., announced that an agreement had been reached with company officials on wage increases for workers in the Clifton and Caldwell plants.

Two weeks ago, A. F. of L. union members staged a six day strike, charging company influence in the election, but work was resumed following recommendations by the National Defense Mediation Board.

No details of the agreement were made available, but union representatives said the wage increase would be "substantial," but only those who voted in the recent NLRB election which designated the independent union as official bargaining agent will be eligible for the increase, it was stated. The agreement has yet to be submitted to the union membership for ratification.

Bituminous Coal Movement Lags Behind 1940 Tonnage

••• Although the movement of coal to the upper Lakes has quickened perceptibly during July and August, especially during the latter month, it is doubtful that the 1941 bituminous movement will exceed the 1940 total of approximately 48,000,000 tons, according to the Ore & Coal Exchange here. The total movement for the current season through Aug. 24 amounted to 26,687,773 tons, or 4,273,256 tons less than the movement up to the same date in 1940. The 1941 movement has lagged behind 1940 tonnages ever since the strike at bituminous coal mines last April.

Industrial Suppliers to Meet

••• A meeting has been scheduled in Milwaukee, on Sept. 8 for industrial distributors, manufacturers of equipment, tools and supplies, and users of industrial products, by the Industrial Supplies Defense Committee of the Industrial Supplies Industry, according to W. C. Stauble, Holo Krome Screw Corp., Hartford, Conn., chairman of the committee.

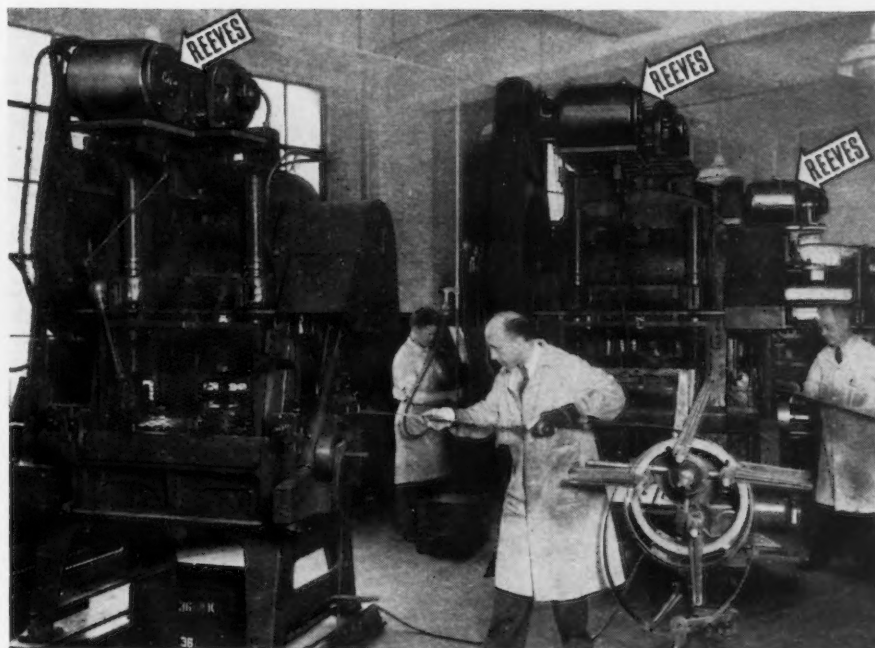
June Steel Imports Total 3727 Tons

Washington

••• Imports of iron and steel (other than scrap) into the United States in June totaled 3727 gross tons valued at \$374,166, according to the Department of Commerce. Although this trade was twice as large as that of May—1875 tons

valued at \$264,591—it was still well below that of June, 1940—5504 tons valued at \$530,343.

Imports of scrap gained sharply with a total of 6473 tons as compared with 3758 tons in May. Cuba was the chief supplier with 4621 tons, while Canada, 1187 tons, Bermuda, 657 tons, and Russia, 8 tons, contributed the remainder.



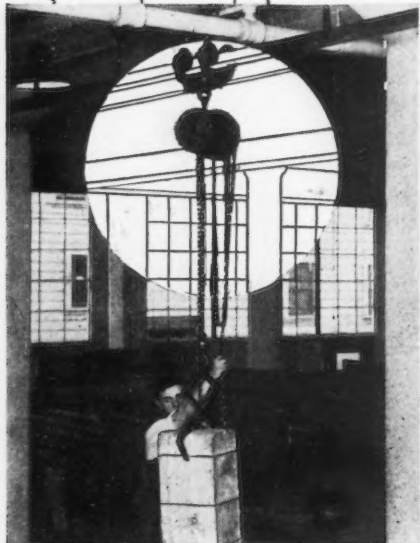
"LIGHTNING FAST" PRODUCTION on many different sizes and shapes of metal parts

Kept in constant operation handling coil stock used in production of various metal parts for Bell System apparatus, manufactured at Kearny, N. J., works of Western Electric Co., these Waterbury-Farrel high speed blanking presses are well able to meet all demands for high production. Each of them is equipped with a REEVES Variable Speed Motodrive. This compact, self-contained unit combines a constant speed motor, a speed varying mechanism and, if required, a gear reducer.

The Motodrive is but one of three REEVES Variable speed units; it is easily and quickly applied and provides the speed flexibility required of modern production machinery. Write for copy of new 24-page "Speed-Up" booklet, picturing and describing installations in 36 different plants.

REEVES PULLEY CO., Dept. 1, COLUMBUS, IND.

REEVES SPEED CONTROL



In steel warehouses, making up orders quickly is the problem. Many different items—all cumbersome, all bulky, all heavy—must be assembled from stock bins for pick-up by delivery trucks.

This California warehouse solved the problem by switching from hand handling with draw trucks to a Reading Monorail and Chain Hoist combination. With a single lift, they now take steel directly from bin to truck.

The result? More orders made up per day! Greater safety and less fatigue for warehouse men! Better satisfied, better served customers!

Want Better Handling In A Hurry?

A Reading Monorail system similar to this is one of the quickest to manufacture, quickest to install handling systems you could buy. Less maintenance, too.

READING CHAIN & BLOCK CORP.
DEPT. 30 READING, PA.

READING

Chain Hoists, Electric Hoists,
Cranes and Monorails

Iron, Steel, Coke Output Maintained by Ohio Plants

Cleveland

••• Republic Steel Corp., Otis Steel Co., American Steel & Wire Co., Carnegie-Illinois and Youngstown Sheet & Tube Co. operated their blast furnaces, open hearths and coke ovens at capacity over the Labor Day week-end holiday. However, finishing departments of these companies were idle except in those instances where bottlenecks existed.

Two New Blast Furnaces Scheduled For Braddock

Washington

••• In its article on expansion of pig iron capacity, THE IRON AGE of Aug. 28, page 96, referred to the plan to build one new furnace at the Braddock, Pa. plant of the Carnegie-Illinois Steel Corp. This was an error. It is planned to build two new furnaces at Braddock, according to the RFC.

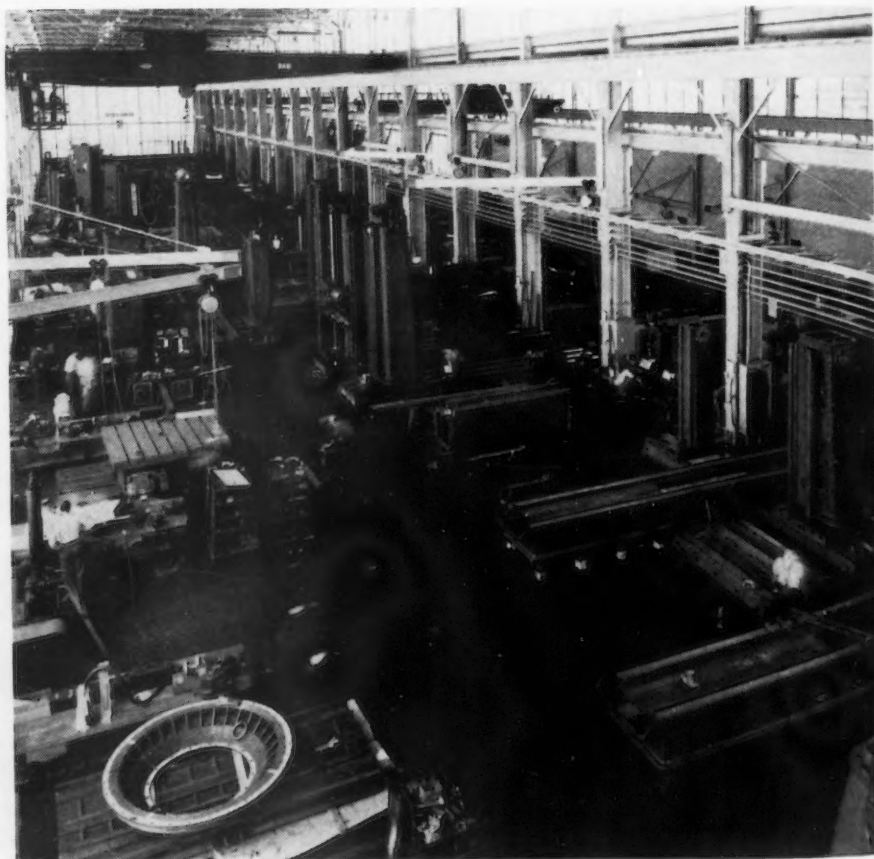
Some Defense Plants Fear Possible Loss of Pig Iron

Olean, N. Y.

••• Plants with defense work near here, as well as at Erie, Meadville, Pa. and at other Northern Pennsylvania and Southern New York localities, have up to now been reasonably supplied with their pig iron requirements and for the most part feel that the recent pig iron mandatory order will make future needs definitely available. There is some anxiety among consumers, however, that integrated steel mills furnishing merchant iron may be forced to commandeer some of this material.

Some believe this fear is groundless of the fact that defense orders will definitely get the right of way on pig iron requirements and also because steel companies have been asked to maintain the same ratio of pig iron in their melt as they did prior to the time when the mandatory pig iron order was issued.

TOOLS FOR DEFENSE: Large horizontal boring, drilling and milling machines are being turned out in this new War Department Emergency Plant operated by Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. The plant was officially opened Aug. 27.



INDUSTRY

New Type of Concrete Roof May Lessen Bar Requirements *Sharon, Pa.*

••• Steel reinforcing bar requirements for the \$1,800,000 expansion program to be launched here within a few weeks by the Westinghouse Electric & Mfg. Co., will be reduced more than 75 per cent by the use of a new type of reinforcing concrete, known as Z-D monolithic concrete shell roof, company officials announced. However, about 500 tons of reinforcing bars will be required in the construction of a new factory building to house the transformer tank and structural iron shop, and the new four-story office building which will also house laboratories.

Full Operations Resumed at U. S. Sanitary Mfg. Co. Plant *Monaca, Pa.*

••• Following an eight-day strike involving 400 men, the U. S. Sanitary Mfg. Co. plant here went back into full operation Tuesday of this week after partial operations were resumed the latter part of last week. The men, members of the SWOC, accepted a compromise wage proposal of the company last week. According to the company, the settlement provided for wage increases and adjustments.

Goodyear Builds New Plant *Cleveland*

••• Goodyear Tire & Rubber Co. soon will build another defense plant to produce airplane parts at Litchfield Park, Ariz., as one more step toward the decentralization of America's defense production facilities. P. W. Litchfield, president, stated that more than \$500,000 would be spent on the building, exclusive of equipment, to provide a factory with some 125,000 sq. ft. of working space.

Metal Inspection Book Published

••• "Inspection of Metals," by Harry B. Pulsifer, metallurgical engineer of American Metal Treating Co., and consulting metallurgist for Ferry Cap & Set Screw Co., Cleveland, has been published by the American Society for Metals. The purpose of the book is to speed up inspection of metals for the defense program.

AMERICA'S LARGEST SINGLE-STORY INDUSTRIAL PLANT PROTECTED BY *Carey* BUILT-UP ROOFS



Albert Kahn
Associated Architects & Engineers, Inc.
General Contractors
Frank Messer & Sons, Inc. Mahony-Troast Co.
Cincinnati, Ohio Passaic, N. J.

Wright
Aeronautical Corporation plant
at Lockland, near Cincinnati, Ohio, covers 50 acres.
Will turn out 1700 H. P. Cyclone Engines at rate of
1,000 a month; eventually
will employ 12,000 workers.

MEETING DEFENSE NEEDS... ...CUTTING OVERHEAD... over all Industrial America

CAREY Roofs are in the forefront of industrial development today, as they have been for over a half century. Because of their dependable service and low upkeep, the popularity of these master specification roofs has grown steadily through the years.

Through constant research, CAREY Roofs have kept pace with building progress—have met every new test of service. Every CAREY Roof is engineered to withstand existing local conditions. Where extremes of temperature, salt air, chemical fumes, vibration, or other factors that affect roof life are present, the roof is designed to neutralize their destructive effects.

Whatever your roofing assignments may be, CAREY experience is a valuable asset that takes the gamble out of roofing results. Specify CAREY Built-Up Roofs for safety—economy. Write for book, "Master Specifications for Built-Up Roofs"—address Dept. 26.

THE PHILIP CAREY MFG. COMPANY • Lockland, Cincinnati, Ohio
Dependable Products Since 1873
IN CANADA THE PHILIP CAREY COMPANY LTD. Office and Factory LENNOXVILLE, P. Q.

Strict OPM Control Seen Likely Soon On Shapes, Bars

Pittsburgh

• • • Already exercising strict control over plate mill rolling and shipping schedules, OPM is expected soon to extend this treatment to structural steel products and possibly hot rolled bars.

At the present plate mills are submitting in advance their

monthly shipping schedules to OPM and approval is necessary before these schedules are put into actual operation. It is expected that in the future, even much more so than in the past, all plate tonnage or at least most, not carrying preference ratings will give way to orders carrying defense requirements and having preference ratings.

Structural deliveries and de-

mand have about reached the tight position exemplified in the plate market, hence the submission of rolling and shipping schedules on these items is expected to be demanded by OPM in the near future.

Potential shell steel demands plus the important part bars are playing in the national defense program seem to presage similar control over hot rolled bar production and shipments, according to informed sources here.

Russian Oil Drums Given A-1-A Rating

This week sheet mills, and consumers of their products, again were feeling the pressure of the defense program and were having their production cut because of the allocation of plate tonnage. Barrel stock for Russian oil drums, however, has been given an A-1-A priority and the material, allocated to several sheet mills, constitutes a "rush shipment." Already exercising strict control over plate mill rolling and shipping schedules, the OPM is expected soon to extend this treatment to structural steel products and possibly hot rolled bars. Practically all pig iron shipments in September will be for defense projects.

Popular Sizes of Nails Are Disappearing at Buffalo

Buffalo

• • • Nails are disappearing faster than any other item in the construction business here and it has become almost impossible to get the most popular sizes. There was not a 16 or 20-penny nail to be had this week in Buffalo wholesale hardware houses and the largest supplier is out of two other popular sizes.

Lake Ship Moved To Atlantic Cleveland

• • • Crispin Oglebay, president, Oglebay, Norton & Co., has announced the transfer of the S.S. Atlantic Trader of the Saginaw Dock & Terminal fleet to the States Marine Corp. of 90 Broad Street, New York, which will operate the vessel under a bare-boat charter on the Atlantic Ocean. The trade will be coastwise between Nova Scotia and South American and West Indian ports.



Headquarters

for ELECTROPLATING, POLISHING AND ANODIZING INFORMATION

For prompt, dependable metal finishing information, call on Udy-lite. No organization is better equipped to give you information gained from installing plating, polishing and anodizing departments in many leading manufacturing plants throughout the country.

Trained plating engineers and electrochemists are at your service. These men know metal finishing and they can help you plan a new installation or revise your present one for greater efficiency. They know, also, that you want information quickly.

Udy-lite has a complete line of

equipment . . . second to none in terms of quality and efficient performance.

and supplies . . . for every metal finishing need. Salts, acids, anodes, buffing and polishing materials—everything required. Call Udy-lite for prompt service on your finishing requirements. You pay no more for Udy-lite dependability.

1 Laboratory where efficiency of Udy-lite finishing processes is maintained by constant control. 2 Design and layout department where clients may obtain the advice of experienced metal finishing engineers. 3 Laboratory where all Udy-lite products are tested under actual plant conditions.

THE UDYLITE CORPORATION

1651 E. Grand Blvd., Detroit, Mich.

New York
60 E. 42nd Street

Chicago
1943 Walnut Street

Cleveland
3756 Carnegie Ave.

Total 1941 Steel Needs Equals 95% of Capacity

••• Estimated steel requirements during 1941 for defense, domestic civilian use, and export total approximately 80,000,000 net tons of steel ingots, or approximately 95 per cent of the industry's capacity as of the beginning of this year, according to a recent study by the committee on commercial research of the American Iron and Steel Institute.

The study is based on statistics of actual shipments of steel to major industries in recent years and during the first quarter of 1941, checked against analyses of expected demand from such sources in the remainder of 1941.

Total estimated requirements for 1941 exceed by approximately 20 per cent the tonnage of steel produced in 1940, the previous peak year for steel production, and are about 60 per cent above the peak annual output in World War I.

Structural Awards Double a Week Ago

Fabricated structural steel awards of 20,900 tons this week are more than double those of a week ago. Sizable lettings are 7000 tons at Salt Lake City, Utah, for a small arms plant for Remington Arms Co., and 4900 tons for a foundry at the Ford River Rouge Plant. New structural steel projects of 25,750 tons are slightly higher than last week's. Reinforcing steel awards total 26,900 tons against 27,000 tons a week ago, the largest letting being 9000 tons for the TVA.

Timken Reports \$4,653,635 Net Profit For First Half Year

••• Timken Roller Bearing Co., reporting for the six months ending June 30, discloses a net profit of \$4,653,635 after depreciation, federal income and excess profits taxes and other charges, the profit being equal to \$1.92 a share on 2,417,380 shares of common stock. For the same period in 1940, Timken reported \$4,996,546 net profit.

New Edition Adds 591 Research Laboratories

••• The seventh edition of the directory "Industrial Research Lab-

oratories of the United States" contains the names of 2264 companies operating research and development laboratories. This new list contains the names of 591 companies not listed in the last previous edition, December, 1938.

The directory is published as bulletin No. 104 of the National Research Council, 2101 Constitution

Avenue, Washington, D. C. It includes an alphabetical list of manufacturing and commercial companies which maintain laboratories, together with a considerable number of consulting laboratories. Four indexes are included. The compilation represents information furnished as a result of a survey of 8200 corporations.



A pair of

ACCURATE HANDS!

PUTTING end loops on tiny springs is an exacting, careful operation. It demands nimble fingers, steady and sure of every move they make. These hands must be capable hands. Here at Accurate, there are hundreds of them busy building the springs, wireforms and stampings you need . . . the way you need them . . . when you need them. They're working hard for you — you can depend on it.

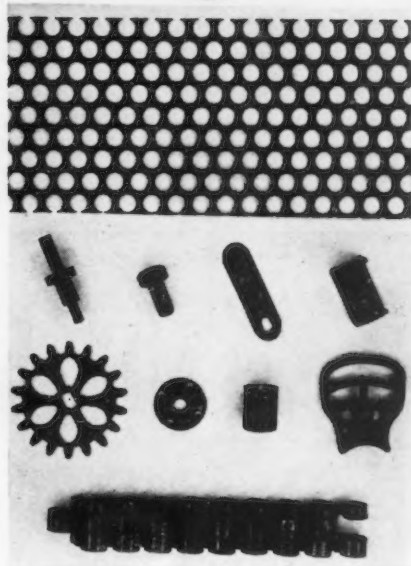
SPRING HANDBOOK

Full of valuable data.
Write for your free
copy today!



ACCURATE SPRING MFG. CO. 3819 W. Lake Street, Chicago

BLACKENING



STEEL PARTS

On a Production Basis!

• The simplicity of the Houghton-Black process makes it readily adaptable to the production line. Comprising a single-bath treatment at 290°-295° F., this process makes possible rapid production blackening at low cost.

With defense demands restricting the use of alloyed steels and various platings, the Houghton-Black method offers a timely process, giving steel parts an even, lustrous black color, resisting oxidation and improving appearance.

Houghton is set up to render individual assistance through its engineering staff to concerns desiring to test this process in their own plant. Ask the Houghton Man for full details, or write—

E. F. HOUGHTON & CO.
PHILADELPHIA

Chicago

Detroit

HOUGHTON-BLACK



Photo by British-Combine

STACKING TORPEDOS: These finished torpedos are being stacked before final inspection in a plant somewhere in England.

Land Favors Concrete Barges Over 1820-Mile Pipe Line

Washington

••• As the row between government heads over building an 1820-mile pipe line from Texas to New York grows in intensity, the OPM was scheduled to receive a report on Tuesday of the present week regarding the possibilities of getting sufficient steel for the line, which is being pushed by Petroleum Coordinator Harold L. Ickes.

Meanwhile strong opposition to construction of the line was expressed by Admiral Emory S. Land, chairman of the Maritime Commission, last Friday in testimony before the Senate Committee investigating the petroleum situa-

(More details on the proposed defense pipe line networks appear on page 84).

tion. The Admiral wants the government to pass up the pipeline construction in favor of the building of 100 reinforced concrete barges, to be towed by tankers. They would require only 110,000 tons of steel, he stated.

"I don't know where they are going to get the 750,000 tons of steel (for the pipeline) but if it is going to come from Navy ships and my ships, I'm against it," the Admiral declared with some heat.

OPM Director William S. Knudsen told THE IRON AGE that consideration was being given to the possibilities of increasing the quantity of seamless tubing for the line in order to cut its demand for 450,000 tons of plates. He added that while this would release plate tonnage for ships and other purposes it of course would have no effect on the ingot demand.

The suggestion for construction of concrete barges is said to have made a favorable impression on members of the Senate Committee. Recommendations for means to meet the eastern gasoline shortage will not be made, however, until after the committee has examined railroad executives concerning the availability of tank cars. Senator Burton, of Ohio, a member of the committee, expressed the hope that the "ultimate solution of the problem would come from the rail carriers."

Throwing its weight back of its program, the Maritime Commission on the day following the testimony of Admiral Land asked 75 contractors to submit bids for the construction of an undisclosed number of concrete barges. The barge building program was decided upon, the Commission said, after a survey showed that its emergency shipbuilding activities are using all the steel that is available for vessel construction.

Trade Notes . . .

Michigan Alkali Co. has consolidated its general sales and executives offices, with both to be located at the Ford Building, Detroit. An eastern branch office will be maintained at 60 E. 42nd Street, New York.

Berlenbach Foundry Co., formerly of Quakertown, Pa., has moved to a new plant at Shelley, Pa.

Gilmore Fabricators, Inc., has moved its office and warehouse to 731 Carlton St., Berkeley, Cal., from Niles, Cal. A. G. Thies is general manager of the company.

Wheelco Instruments Co., Chicago, in its third expansion since 1935, has moved to its own building, Harrison and Peoria Streets. The company expects to double its factory and office personnel.

H. B. Davis Iron & Steel Co., Portland, Ore., has changed its name to Northwest Steel Products, and is now located at 2262 N. W. Nicolai Street, Portland.

Douglas Aircraft Co.'s Long Beach Plant Materiel Division has vacated its temporary quarters in Los Alamitos, Cal., and has moved to 3855 North Lakewood Boulevard, Long Beach, Cal.

Cutler-Hammer, Inc., Milwaukee, has moved its home sales district offices from the factory to a suite in the Carpenter building, 536 W. Wisconsin Avenue. Increased business due to defense orders made it necessary to provide additional space for the drafting and engineering divisions.

Harry Harris & Co. will remove their offices from 120 Broadway, New York, to their new office and yards at 33 Passaic Avenue, Kearny, N. J., on Aug. 15. At the new location Harry Harris & Co. are equipped to handle shipments by rail, water, or truck.

Foxboro Co., Foxboro, Mass., instrument manufacturer, has moved its Cincinnati office to 607 American Building, Walnut Street and Central Parkway.

The Standard Tool & Die Co., Milwaukee, has changed its name to Standard Tool & Gage Corp.

A. O. Smith Corp., Milwaukee, has purchased an adjacent tract of land on W. Hopkins Rd., Milwaukee, from the Janesville Sand & Gravel Co. for \$30,000.

The Art Metal Construction Co., with plants at Jamestown, N. Y., and London, England, has opened a sales office at 630 No. Broadway, Milwaukee, with Henry Moran in charge.

On Aug. 15 P. R. Mallory & Co., Inc., moved its Detroit office to a new location at 3026 E. Grand Boulevard, according to William M. Hayes, Detroit sales manager.



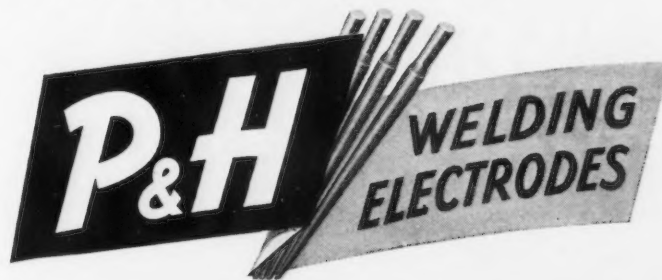
TEAR CORAL ROCK TO PIECES!

These dredge cutter blades, now being rebuilt with P&H Harcote, are delivering three and four times more work hours than formerly on this highly abrasive application in Florida. This is due to the superior hardness and strength of this outstanding electrode. (Full information on request.)

HARCOTE

Its semi-austenitic weld metal has a hardness of approximately 50, Rockwell C, in its as-welded state and builds up great resistance to abrasion under cold working. May be applied to carbon steel, low alloy, and high manganese surfaces.

P&H Harcote is highly recommended for the hard surfacing of many products subject to severe abrasion such as shovel teeth, scraper blades, farm implements, lips and bottoms of shovel buckets, sand and rock handling equipment, etc. An all-position electrode. Ask for simple procedures.



General Offices: 4401 West National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER CORPORATION

WELDING ELECTRODES • MOTORS • HOISTS • P&H • ELECTRIC CRANES • ARC WELDERS • EXCAVATORS

Detroit Library Lists Texts For Training in Industry

Detroit

• • • A list of books, publications and manuals useful for training-for-industry and training-in-industry programs has been prepared by the technology department of the Detroit Public Library. The list, entitled "Drafted for Service:

The Public Library and all its Books on the National Defense Trade," also includes selections for enrollees and trainees in defense training courses and skilled mechanics on the job. "Budget kits" which list groups of books that can be purchased at \$25 to \$100 are suggested for industrial plants to provide textbook material for employees learning specific trades.

Text on Metal Processing Revised by Prof. Boston

• • • Written as a college textbook, but useful to production executives, tool engineers and draftsmen is a new book on "Metal Processing," by Prof. Orlan W. Boston, chairman, Department of Metal Processing, University of Michigan. The text represents a revision of material originally published in two volumes under the title, "Engineering Shop Practice," by the same author.

All steps involved in designing for production are covered in the first chapter, including writing of operation sheets, selection of equipment and plant layout. Subsequent chapters treat in detail the various classes of machines, processes and factors involved in machine shop work. The book emphasizes particularly the nomenclature of tools and the subject of machinability. Extensive data are given to show cutting forces, power consumed, tool life, chip formation and surface quality as influenced by the properties of the material being machined, the cutting fluid and the tool shape and quality. The book is published by John Wiley & Sons, Inc., New York. Price \$5.



True Pickling Economy is measured

by steady—day by day performance rather than in flashy, single showings:

Wheeling Bronze Mechanical Pickling machines used for pickling strip—cold drawn bars and tubing—have that inbuilt stamina that is the basis of reliable performance. Low maintenance cost.

WRITE TODAY FOR FULL PARTICULARS



\$8 Million Plane Starter Order Goes to Cleveland Firm

• • • Jack & Heintz, Inc., a firm which moved here from the West Coast early this year, has received a new \$8,000,000 order from the War Department for electric starters for military aircraft engines. According to W. S. Jack, president, the company now has a backlog of \$15,000,000 of unfilled orders for its plant in nearby Bedford.

Autocall Co. Expands Shelby, Ohio

• • • An expansion program, costing \$100,000, has just been completed by the Autocall Co., holder of a \$1,250,000 federal contract for anti-aircraft equipment. When work upon the government order, the biggest award in this area, hits its peak later in the year about 100 additional men will be hired. The order must be completed by next summer.

Film for Schools Explains Use of Optical Comparator

•••To provide technical training schools and other institutions giving technical courses with material for instruction in modern methods of inspection and thread production, the Jones & Lamson Machine Co., Springfield, Vt., has prepared two slide films illustrating their optical comparators and automatic thread grinders. Each film is accompanied by a written description in lecture form that describes the use and application of these machines.

The films can be projected with any standard 35 mm. slide film projector and either or both will be sent gratis to any university, technical school, or other institution providing technical courses, upon request of the principal in charge.

Aluminum Co. Will Publish Series of Technical Bulletins

Pittsburgh

•••To serve the needs of aircraft and other defense industries using aluminum, the Aluminum Co. of America is publishing a series of technical information bulletins showing the most recent developments of their technical departments. Bulletin No. 1, just issued, lists 100 references on aluminum of special interest to manufacturers of defense materials, covering metallurgical aspects of aluminum as well as its application in a variety of industries.

Oakite Products Expands Laboratory Facilities

New York

•••The metals section of the Oakite Research Laboratories has recently been expanded to the point where it provides modern facilities for reproducing, on a pilot plant scale, actual production conditions generally found in metal plating and fabricating plants. Equipment includes buffing machines, spray type metal washing machine, steel cleaning solution tanks, running water tank and shower sprays for rinsing, rectifiers and a number of pyrex glass plating tanks.

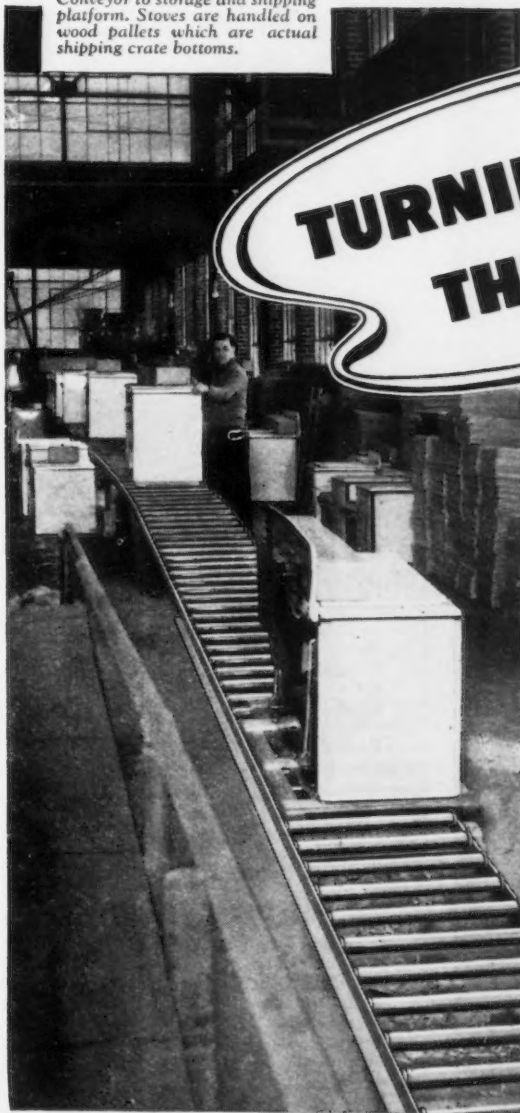
Bremacc Names Officers

Detroit

•••Bremacc Corp., organized with a capital of \$350,000 to design and manufacture a standard line of down-cut milling machines and special machines and tools, has announced that Edward W. Brehm will be president of the corporation, A. C. Carlson, vice president; Richard A. Forsyth, secretary, and

Ralph Fordon, treasurer. On the board of directors are Mr. Brehm, Mr. Carlson and Richard D. Young of Detroit; J. A. Bursley, Ann Arbor; William J. Clarke, Grand Rapids, and Edward S. Wellock, Bay City. Mr. Brehm is president of Capital Management Corp. and Bremdun, Inc. Most of the men associated with the company have been previously associated in Capital Management Corp.

★ Coming off final Conveyor Assembly Line, the completed stoves travel via Logan Roller Conveyor to storage and shipping platform. Stoves are handled on wood pallets which are actual shipping crate bottoms.



TURNING ON THE HEAT!

It's "fair and warmer" along production lines in this stove manufacturing plant. Another company that had the foresight to conveyorize all possible operations three years ago!

Logan equipment, by putting flow into production, takes the raw edge off rush work, permits increased volume with existing facilities, saves time and effort, and makes other cash economies that count. Is your production tempo at comfortably warm temperature? Are you geared to the handling needs of the day? Write for catalog or for nearest engineer. LOGAN, 545 Cabel, Louisville, Ky.

Logan Conveyors
PUT FLOW INTO PRODUCTION

Government Awards

War Dept., Ordnance:

Abrasive Co., Philadelphia; grinding wheels	\$1,100
Adirondack Foundries & Steel, Inc., Watervliet, N. Y.; castings	9,626
Allegheny Forging Co., Pittsburgh; roller rims for casting machine rolls	1,260
Allegheny Ludlum Steel Corp., Watervliet, N. Y.; steel	2,201
H. F. Allen Co., Inc., Buffalo; presses, drill	2,910
Allen Mfg. Co., Hartford; screws	5,207
Allen - Bradley Co., Milwaukee; switches, drum	2,755
Aluminum Co. of America, Massena, N. Y.; aluminum	8,284
Aluminum Seal Co., New Kensington, Pa.; parts for fuses	15,730
American Locomotive Co., New York; roller rims for casting machine rolls	8,550
American Steel & Wire Co., Worcester; parts for fuses	2,216
Ampco Metal, Inc., Milwaukee; castings, centrifugal, aluminum bronze	1,401
Ampco Twist Drill Co., Jackson, Mich.; drills	10,802
Anchor Post Fence Co., Baltimore; ammunition trays	71,214
Ansonia Mfg. Co., Ansonia, Conn.; drifts	1,247
Armstrong-Blum Mfg. Co., Chicago; hack saws	1,794
Arrow Metal Products Co., Detroit; drills, jigs and fixtures	14,940
Barber-Colman Co., Rockford, Ill.; reamers	1,537
Barnes Drill Co., Rockford, Ill.; machines, drilling	5,750
Bausch Machine Tool Co., Springfield, Mass.; machines, lead screw tapping	3,231
Bay State Abrasive Products Co., Westboro, Mass.; wheels, grinding	1,111
J. B. Beaird Corp., Shreveport, La.; shells	1,976,000
Bendix Aviation Corp., Eclipse Aviation Division, Bendix Radio Corp., Bendix, N. J.; parts, misc.	275,538
Bendix Aviation Corp., Marine Division, Brooklyn; repeaters	32,670
Bethlehem Steel Co., Bethlehem, Pa.; demolition bombs and steel	123,008
Botwinik Brothers, Inc., Hamden, Conn.; lathes, turret	3,400
F. M. Bickford Co., Dayton, Ohio; fuses	389,667
Blair Kent Aircraft Co., Camden, N. J.; base supports	10,000
Blaw-Knox Co., Union Steel Castings Division, Pittsburgh; castings	2,050
Bridesburg Engineering Co., Philadelphia; tools	9,545
Brown-Lipe Gear Co., General Drop Forge Division, Buffalo; forgings	35,614
Brown & Sharpe Mfg. Co., Providence; grinders	1,353
Brown Tool & Mfg. Co., Rising Sun, Ind.; drills, jigs and fixtures	1,869
Burroughs Adding Machine Co., Davenport, Iowa; machines, calculating	1,938
Carboloy Co., Inc., Detroit; dies, tool grinders	5,986
Carnegie-Illinois Steel Corp., Pittsburgh; steel	208,764
Carpenter Steel Co., Reading, Pa.; steel	67,050
Carrier Corp., Syracuse, N. Y.; equipment for air conditioning system	3,883
Catskill Metal Works, Inc., Catskill, N. Y.; machines, cutoff, abrasive	2,475
C. B. Christiansen, Newark; guides, holders and bushings	2,960

Cincinnati Milling Machine and Cincinnati Grinders, Inc., Cincinnati; machine tools	543,080
Cincinnati Shaper Co., Cincinnati; machines, traverse shaper	3,640
Cleveland Automatic Machine Co., Cleveland; equipment for lathes	1,621
Cleveland Twist Drill Co., Cleveland; drills, reamers	9,583
Collins Electric Co., Inc., Springfield, Mass.; control equipment for electric motors	1,729
Columbus Forge & Iron Co., Columbus, Ohio; forgings	1,855
Continental Machines, Inc., Minneapolis; machines, contour cutting	3,812
Continental Motors Corp., Muskegon, Mich.; fan assemblies, gears, rocker assemblies and front motor supports	24,309
Cross Gear & Machine Co., Detroit; machines, cross gear tooth rounder	5,090
Crucible Steel Co. of America, New York; steel	16,860
Crucible Steel Casting Co., Milwaukee; castings, molybdenum	1,129
Cuyahoga Spring Co., Cleveland; springs	9,532
Dallett Co., Philadelphia; chisel blanks	1,950
Dana Tool-D Nast Machinery Co., Philadelphia; vises, machinist	1,595
Dempster Bros., Inc., Knoxville, Tenn.; hoisting units and buckets	3,675
Die Casters, Inc., Ridgefield, N. J.; castings	9,237
G. M. Diehl Machine Works, Inc., Wabash, Ind.; machines, veneer jointer	4,745
Electric Service Supplies Co., Philadelphia; blocks, vee	1,110
E. L. Essley Machinery Co., Chicago; presses, drill; and machines, drilling and tapping	23,142
Federal Machinery Sales Co., Chicago; presses	59,659
Federal Screw Works, Detroit; pins, latch clip	1,342
A. Finkl & Son, Chicago; blocks, die	1,020
Firth-Sterling Steel Co., McKeesport, Pa.; dies	1,742
F. A. French, Latrobe, Pa.; primers, percussion	13,250
Gairing Tool Co., Detroit; reamers, tools	22,427
General Electric Co., Schenectady; motors	4,062
General Engineering Co., St. Louis; machines, shaper	6,388
Gisholt Machine Co., Madison, Wis.; lathes, turret	29,180
Globe Steel Tubes Co., Milwaukee; seamless tubing	1,181
Goodman Mfg. Co., Chicago; dies	1,632
Great Lakes Steel Corp., Ecorse, Detroit; steel	3,124
Greenfield Tap & Die Co., Greenfield, Mass.; taps, hand	1,760
H. A. K. Products Corp., Ft. Lauderdale, Fla.; projectiles	8,000
Hanson-Whitney Machine Co., Hartford; taps	1,028
Harding Brothers, Inc., Elmira, N. Y.; machines, milling	4,920
Heidrich Tool & Die Corp., Detroit; presses	601,207
Hollup Corp., Chicago; electrodes, welding	3,233
Indianapolis Machinery & Supply Co., Inc., Indianapolis; lathes, turret	2,260
Jacks-Evans Mfg. Co., St. Louis; links, metallic belt	964,800
B. Jahn Mfg. Co., New Britain, Conn.; dies	2,140
Jessop Steel Co., Washington, Pa.; steel	1,464
Johnson Claffin Corp., Marlboro, Mass.; gages	2,242

Greater Tonnage
Per Edge of Blade



AMERICAN
SHEAR KNIFE CO.
HOMESTEAD · PENNSYLVANIA

AWARDS

Jones & Lamson Machine Co., Springfield, Vt.; parts for lathe	1,281
Kearney & Trecker Corp., Milwaukee; machines, milling	31,920
John P. Kelley, Philadelphia; castings	5,021
Kempsmith Machine Co., West Allis, Wis.; machines, milling	7,874
Koppers Co., Baltimore; parts for gun carriages	226,836
Krebs Mfg. & Engineering Co., Chicago; drills, jigs and fixtures	6,635
Larkin Packer Co., Inc., Davis Boring Tool Division, St. Louis; boring bars	1,490
LeBlond Machine Tool Co., Cincinnati; lathes and grinders	204,401
Liberty Tool & Die Corp., Rochester, N. Y.; fixtures	9,595
Lincoln Mfg. Co., Chicago; components for gun	2,251
Lincoln Tool & Die Co., Detroit; drills, jigs and fixtures	1,267
Lindberg Engineering Co., Chicago; carrier arms, electric furnaces	19,223
Louden Machinery Co., Fairfield, Iowa; monorail system	4,322
Machinery Mfg. Co., Los Angeles; grinders	6,500
Madison-Kipp Corp., Madison, Wis.; furnaces	28,040
Magnaflux Corp., Chicago; units, magnetizing	2,652
Manning, Maxwell & Moore, Inc., Jersey City; drills and reamers	2,754
Measuregraph Co., St. Louis; fin assemblies	39,937
Mereen-Johnson Machine Co., Minneapolis; saws, band rip	3,433
Metalweld, Inc., Philadelphia; additions to pickling and washing units	15,379
Micromatic Hone Corp., Detroit; honing machines	4,895
Midvale Co., Nicetown, Philadelphia; forgings	13,089
Miles Machinery Co., Saginaw, Mich.; machines, boring, milling and drilling	20,264
Millersburg Reamer & Tool Co., Millersburg, Pa.; mills, end, tapered shank	2,075
Modern Collet & Machine Co., Ecorse, Detroit; collets	1,237
Modern Die & Machine Co., Boston; fixtures	3,065
Mohawk Machine & Tool Co., New York; gages	1,470
Molded Insulation Co., Philadelphia; switches, battery	1,737
Motor City Tool Co., Inc., Detroit; fixtures	3,085
National Lock Washer Co., Newark; forgings	3,478
New Britain Machine Co., New Britain, Conn.; tapping attachments	1,728
New Britain Machine Co., New Britain-Gridley Machine Division, New Britain, Conn.; machines, automatic screw	4,467,315
New England Gas Products, Inc., Charlestown, Mass.; cylinders, gas, acetylene	2,376
Niles-Bement-Pond Co., Pratt & Whitney Division, Hartford; gages and parts	74,807
Norton Co., Worcester; grinding wheels	6,049
Ohio Seamless Tube Co., Shelby, Ohio; tubing	6,903
Oliver Machinery Co., Grand Rapids, Mich.; machines, circular saw	75,222
Otis Steel Co., Cleveland; steel	26,223
Read Machinery Co., Inc., York, Pa.; preheaters, ammonium nitrate	32,250
Reliable Tool Co., Inc., Irvington, N. J.; holders, bolts, punches and dies	3,311
Remington Arms Co., Inc., Bridgeport, Conn.; shot, lead	2,575
Republic Steel Corp., Alloy Steel Division, Massillon, Ohio; steel	3,761

Here's a
**CHEERFUL
NOTE!**

These days when fabricators and processors face so many difficult equipment and production problems, it's refreshing to discover the serviceability and economies which IngAclad offers.

It's a cheerful note you will not forget even when the emergency is over, because you will always like the service it gives and welcome the savings it makes. You will find, as have so many others, that in many types of equipment IngAclad Stainless-Clad Steel...

- serves equally as well as the solid metal, and
- makes Stainless go 5 times as far
- fabricates much more easily than solid stainless sheets and plates of similar gauge
- gives perfect stainless service on the side that is used
- costs much less, and
- enables you to use Stainless much more widely

Write for special IngAclad Folder

Let us show you how this remarkable achievement in Steel by the Ingersoll Patented Ingot Process is cutting costs for many. Remember, too, that only IngAclad Stainless-Clad Steel has a proven 10-year record in successful use. Fabricators are invited to write for the IngAclad Welding Manual.

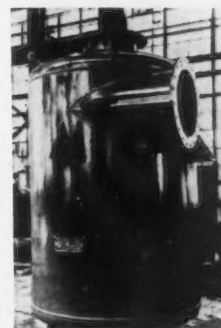
INGERSOLL STEEL & DISC DIVISION

BORG-WARNER CORPORATION

310 South Michigan Ave.
Chicago, Illinois

Plants: Chicago, Ill.; New Castle, Ind.; Kalamazoo, Mich.

Unretouched photo of machine-cutting. Note the inseparable bond formed between the mild steel and the cladding of stainless steel.



Flick Centrifugal Entrainment Separator installed in Armour & Company Soap Works, Chicago. Outer shell, intake and outlet pipes are of IngAclad. Designed and built by Wurster and Sanger, Consulting Chemical Engineers, Chicago, Illinois.

1

The same amount of Solid Stainless when used in the form of IngAclad makes 5 Sheets or Plates of the same size and gauge.



Users of INGACLAD include:

American Cyanamid Co.
R. D. Cole Mfg. Co., Newnan, Ga.
Dow Chemical Co.
E. I. DuPont de Nemours Co.
Greenville Steel & Foundry Co., Greenville, So. Car.
Holliston Mills, Kingsport, Tenn.
Leader Iron Works, Decatur, Ill.
Monsanto Chemical Co.
Sayles Finishing Plants, Inc.
Sheet Metal Engineering Co., Chicago.
Southern Bleachery & Print Works, Taylors, So. Car.
Stevens Metal Products Co., Niles, Ohio.

IT WILL PAY YOU TO INVESTIGATE THE ECONOMIES OF
INGACLAD
STAINLESS-CLAD STEEL
"A BORG-WARNER PRODUCT"

GOVERNMENT AWARDS

Rotary Electric Steel Co., Detroit; steel	43,186
St. Louis Steel Products Co., St. Louis; assemblies, arming wire	141,605
Scovill Mfg. Co., Waterbury, Conn.; baffles, for fuse	2,975
Sharon Steel Corp., Sharon, Pa.; steel	13,220
Sheet Aluminum Corp., Jackson, Mich.; aluminum	131,598
Sheffield Corp., Machine Tool Division, Dayton, Ohio; gages	6,495
W. E. Shipley Machinery Co., Philadelphia; machines, grinder	25,532
Simplex Wire & Cable Co., Cambridge, Mass.; cable	1,563
Smith & Mills Co., Cincinnati; machines, crank shaping	54,985
Sperry Gyroscope Co., Brooklyn; plug assemblies	3,051
Springfield Machine Tool Co., Springfield, Ohio; lathes	10,774
Standard Gage Co., Poughkeepsie, N. Y.; gages	6,797

Standard Pressed Steel Co., Jenkintown, Pa.; screws	4,200
Stanley Works, Stanley Tools Division, New Britain, Conn.; vises	13,773
Stearns-Roger Mfg. Co., Denver; lathes	830,400
Sundstrand Machine Tool Co., Rockford, Ill.; equipment for Rigidmils and Electromils	9,474
Super Steel, Inc., Cleveland; steel	2,170
Surface Combustion Corp., Toledo, Ohio; furnaces	78,141
Talon, Inc., Meadville, Pa.; gages	2,173
Taylor-Wharton Iron & Steel Co., Easton, Pa.; cylinders, compressed gas	17,500
Thompson Grinder Co., Springfield, Ohio; machines, broach sharpener	6,210
Union Twist Drill Co., Chicago; drills, taps and other cutting tools	12,400
Unique Specialties, Inc., New York; dies, punches, holders,	

supports	3,030
United States Gage Co., Sellersville, Pa.; gages	1,907
U. S. Reduction Co., East Chicago, Ind.; lead, pig	7,232
U. S. Tool & Mfg. Co., Dearborn, Mich.; tools	2,057
Universal - Cyclops Steel Corp., Bridgeville, Pa.; steel	5,142
V & O Press, Inc., Hudson, N. Y.; presses	62,000
Veit & Young, Philadelphia; funnels, ejecting stems, dies and punches	44,010
Vinco Corp., Detroit; gages	5,236
Waldorf Mechanical Lab., Inc., New York; gages	4,800
Warner Electric Brake Mfg. Co., Beloit, Wis.; parts for gun carriage	1,091
Warner & Swasey Co., Cleveland; tools	1,373
Jervis B. Webb Co., Detroit; install conveyor system	2,265
Webster, Warren & Co., Philadelphia; steam heaters	2,456
Weldon Tool Co., Cleveland; countersinks	1,135
Wheland Co., Chattanooga, Tenn.; shells	396,000
Widerhold & Hubbard, Inc., New York; gages	8,644
Williams-White & Co., Moline, Ill.; machines, eye bending and tools	7,850
Winter Bros. Co., Wrentham, Mass.; taps	1,279
Zimmerman Steel Co., Bettendorf, Iowa; castings, steel	7,817

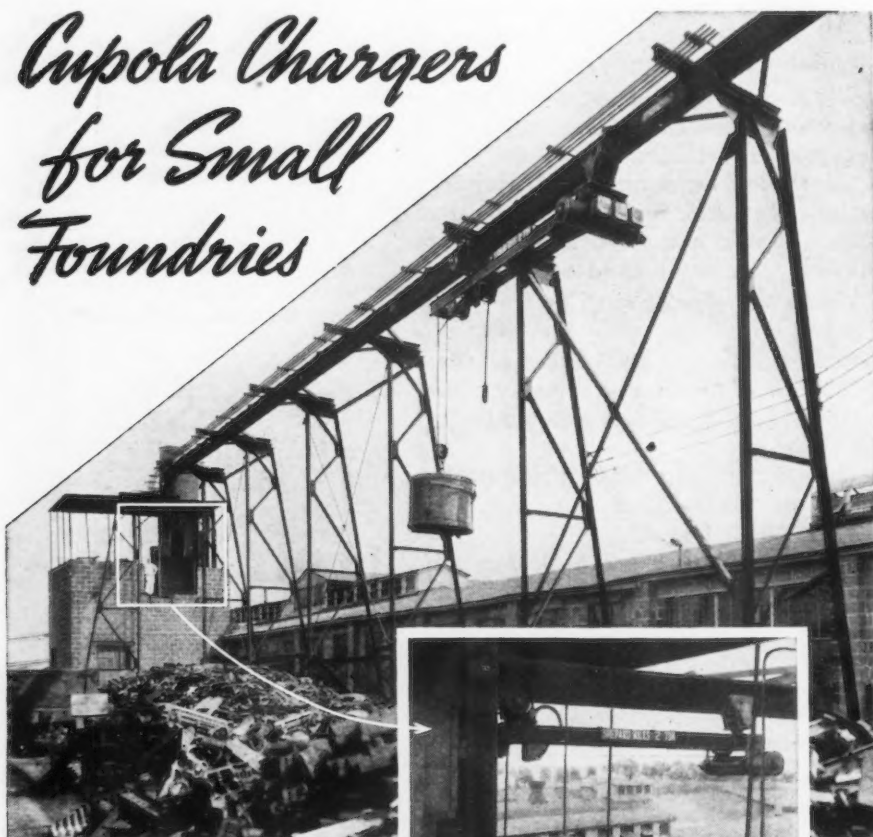
War Dept., Air Corps:

Aerial Machine & Tool Corp., New York; mount assemblies, gun	\$124,920
Beach-Russ Co., New York; vacuum pumps	91,109
Buffalo Forge Co., Buffalo; fan system	178,840
C & E Marshall Co., Chicago; lathes	82,000
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati; grinders, tool & cutter	45,047
Cleveland Pneumatic Tool Co., Cleveland; forceps	63,825
Fleetwings, Inc., Bristol, Pa.; airplanes and spare parts	4,555,614
Hanlon & Goodman Co., Belleville, N. J.; brushes	55,980
International Engineering, Inc., Dayton, Ohio; lamp assemblies	243,991
Lord Mfg. Co., Erie, Pa.; absorbers	76,430
Motch & Merryweather Machinery Co., Cleveland; grinders	28,594
North American Aviation, Inc., of Texas, Inglewood, Cal.; spares for the maintenance of aircraft	63,519
North American Aviation, Inc., of Texas, Dallas; airplanes and spare parts	6,980,612
Rolls-Royce, Inc., Detroit; tools for engines	160,022
Taylor Machine Co., Cleveland; hoist assemblies	48,681
Wright Aeronautical Corp., Paterson, N. J.; miscellaneous maintenance parts for aeronautical engines	19,268,820

War Dept., Corps of Engineers:

Aluminum Cooking Utensil Co., New Kensington, Pa.; steam jacketed kettles, Scott Field, Ill.	\$2,189
Boardman Co., Oklahoma City; routabout, double drum, hydraulic cranes, Aircraft Assembly Plant, Tulsa, Okla.	12,892
J. I. Case Co., Racine, Wis.; industrial tractors, Aircraft Assembly Plant, Tulsa, Okla.	4,108
Central Foundry Co., Bessemer, Ala.; pipe and pipe fittings, MacDill Field, Fla.	\$3,396
James Clark, Jr., Electric Co., Louisville, Ky.; electric drills,	

Cupola Chargers for Small Foundries



● Mechanical cupola charging systems are now available for small foundries with daily melts of 15 to 30 tons.

No need for an expensive cupola enclosure or charging floor. An inexpensive runway to carry the charger and an operator's platform

at the cupola door is all the construction necessary.

Foundrymen who seek better metal at lower costs—no matter what the daily tonnage may be—can obtain complete information by writing to Montour Falls.

A
COMPLETE
LINE OF
CRANES &
HOISTS

SHEPARD NILES

CRANE & HOIST CORP.

356 SCHUYLER AVENUE . . . MONTOUR FALLS, N. Y.

GOVERNMENT AWARDS

Aircraft Assembly Plant, Kansas City, Kan.	3,020
Cleveland Pneumatic Tool Co., Cleveland; portable compression riveters, Aircraft Assembly Plant, Tulsa, Okla.	24,000
James B. Clow & Sons, Chicago; water pipe, bell and spigot, Scott Field, Ill.	34,370
Egleston Bros. & Co., Inc., Long Island City, N. Y.; structural steel, Mitchel Field, Long Island, N. Y.	4,686
Flockhart Foundry Co., Newark; manhole frames and covers, Westover Field, Chicopee Falls, Mass.	2,140
Fosdick Machine Tool Co., Cincinnati; radial drill, Aircraft Assembly Plant, Kansas City, Kan.	9,046
Frey Bros., Inc., Indianapolis; water-conditioning equipment, Aircraft Assembly Plant, Kansas City, Kan.	83,800
General Motors Corp., Chevrolet Division, Detroit; trucks, Wright Field, Dayton, Ohio	3,529
M. J. Gibbons Supply Co., Dayton, Ohio; pipe hangars, Patterson Field, Fairfield Air Depot, Osborn, Ohio	4,704
Hardinge Brothers, Inc., Elmira, N. Y.; lathes, Aircraft Assembly Plant, Kansas City, Kan. ...	14,119
Hobart Mfg. Co., Troy, Ohio; dishwashers, Jefferson Barracks, Mo.	9,460
Hussman-Ligonier Co., St. Louis; refrigerators, Orlando, Fla., Air Base and MacDill Field, Tampa, Fla.	2,962
Kelly Cash & Package Carrier Co., Chicago; pneumatic tube system, Aircraft Assembly Plant, Kansas City, Kan.	5,106
Lee Metal Products Co., Inc., Phillipsburg, Pa.; steam jacketed kettles, Jefferson Barracks, Mo.	69,000
Machine Tool & Supply Co., Tulsa, Okla.; electric drills, Aircraft Assembly Plant, Tulsa, Okla. ...	2,460
Magnaflux Corp., Chicago; inspection unit, Aircraft Assembly Plant, Tulsa, Okla.	2,890
McWane Cast Iron Pipe Co., Birmingham, Ala.; cast iron pipe fittings, Scott Field, Ill.	14,927
Nelson Concrete Culvert Co., East St. Louis, Ill.; sewer pipe and fittings, Scott Field, Ill.	4,940
Ohio Corrugated Culvert Co., Middletown, Ohio; steam tunnel cover plates, Patterson Field, Fairfield Air Depot, Osborn, Ohio	96,068
W. Q. O'Neill Co. of Ill., Springfield, Ill.; pipe, Scott Field, Ill.	70,470
Short & Shockley, Bethany Beach, Del.; construction of bulkheads, Indian River Inlet, Del.	
War Dept., Signal Corps:	
Acorn Insulated Wire Co., Brooklyn; wire	\$1,137
Anaconda Wire & Cable Co., Ansonia, Conn.; wire	228,034
Barco Mfg. Co., Chicago; hammers, power	1,577
Bates Mfg. Co., Orange, N. J.; staplers and staples	5,431
H. O. Boehme, Inc., New York; coils	895
High Tension Co., Phillipsburgh, N. J.; sleeves	967
Illinois Malleable Iron Co., Chicago; axes	8,430
Indiana Steel & Wire Co., Muncie, Ind.; wire	2,054
Martin Hardsoeg Co., Pittsburgh; bars	2,926
Pako Corp., Minneapolis; washers	681
Roberts Numbering Machine Co., Brooklyn; numbering machines.	7,380
Simplex Wire & Cable Co., Cambridge, Mass.; cable assys. and reels	114,129

Charles G. Stott & Co., Inc., Washington; posting machines	1,797
A. J. Ulmer, Rutherford, N. J.; ground rods	4,824
Whitney Blake Co., New Haven, Conn.; wire	1,243
J. H. Williams Co., Buffalo; wrench sets	8,535
W. S. Wilson Corp., New York; tool equipment	234,030
War Dept., Quartermaster Corps:	
American Bantam Car Co., Butler, Pa.; assemblies & spare parts for trucks	\$6,560
Amphibian Car Corp., Buffalo; one-half ton trucks	102,600

Banner Bed Co., Chicago; 50,000 cots, folding, steel	170,060
Barcalo Mfg. Co., Buffalo; 150,000 cots, folding, steel	485,500
Behrend & Rothschild, New York; 7000 ea. company commander whistles	1,925
Sam Bergesen, South Tacoma, Wash.; portable steel igloo type magazines, Ft. Lewis, Wash. ...	75,700
A. L. Coupe Construction Co., Inc., Louisville; motor repair shops and garages, Fort Knox, Ky. ...	95,485
Charles Dahlgren, Tacoma, Wash.; motor repair shops, etc.	31,555
Electric Boat Co., Bayonne, N. J.; stock cruisers	88,156

STRONG - MOLD



THE STRONG WAY PAYS IN MANY WAYS

You can put it all up to Strong, if you have a steel casting from 30 ounces to 30,000 pounds—or a size range of almost any conceivable shape or proportion. The sweep method shown above—typical of Strong's versatility—saves the customer the costly pattern making otherwise needed for this unusually shaped, 33,000 pound casting.

Strong molding facilities range from small snap flasks to steel flasks 16 feet square. This size range is governed only by the size of Strong's largest drying oven (24 x 20 feet). Be sure you know the modern art of steel casting, as Strong has developed it!

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N. Y.

STRONG



TENSILE STRENGTH • ELONGATION

the practical side of Springmaking — BY DUNBAR

SPRINGS on the Square



When springs are coiled from square wire the material becomes keystone shape. The keystoneing is more pronounced as the diameter of the spring lessens. This effect must be considered when figuring the solid height of springs made from square wire. For figuring this keystoneing effect we suggest the following formula:

$$d^1 = .48d \left(\frac{OD}{PD} + 1 \right)$$

d = Original wire size.

d¹ = Width of wire after coiling.

OD = Outside diameter of spring.

PD = Mean diameter of spring.

For best results anticipate the obstacles to good design *before* the springs are made.

Dunbar Bros. Co.

DIVISION OF ASSOCIATED SPRING CORPORATION

BRISTOL, CONNECTICUT

"Quality Springs since 1845"

CUT THOSE PRODUCTION KNOTS

with a Wells!



Now Built in 3 Sizes
No. 5—5" dia. round
or 5" x 10" flat.
No. 8—8" dia. round
or 8" x 16" flat.
No. 12—12" dia. round
or 12" x 16" flat.
Also the No. 9 Upright
Saws

Wells SAWS
THE SIGN OF SERVICE

• If metal cutting seems to tie things up in your plant—put a Wells Band Saw to work. It will handle 1001 jobs in the stockroom, production line, or on maintenance work—because it's fast,

versatile, accurate and portable. You can get a Wells quickly, and the cost is low. Check into the details today.

WELLS MFG. CORP.
Three Rivers, Mich.

Visit us at
the Metal
Show in
October—
Booth E-54

GOVERNMENT

Equitable Equipment Co., New Orleans; oil barge	19,900
Fargo Motor Corp., Detroit; trucks, 1½-ton, and ambulances, 1½-ton	1,143,850
General Motors Corp., Chevrolet Division, Detroit; light 5-passenger sedan cars	56,310
eight-passenger carryall trucks	3,822
one-half ton trucks	3,788
Higgins Industries, Inc., New Orleans; construction and delivery of boats	29,170
Illinois Lock Co., Chicago; locks, cylinder type, 3289	62,491
Indian Motorcycle Co., Springfield, Mass.; motorcycles	52,166
International Harvester Co., Fort Wayne, Ind.; trucks, dump, 2½-ton	1,051,490
National Enameling & Stamping Co., Granite City, Ill.; 100,000 ea. water containers	186,500
Shirley Olcott & Nichols, Washington; truck tire chains and adjusters	61,889
A. Streich & Bros. Co., Oshkosh, Wis.; one-half ton trailers	8,800
Studebaker Corp., South Bend, Ind.; spare parts	942,181
Superior Sleeprite Corp., Chicago; 50,000 cots, folding, steel	167,500
Warner Electric Brake Mfg. Co., Beloit, Wis.; cables	1,612
Western Chain Products Co., Chicago; truck chains	41,738

Defense Plant Building:

McQuay-Norris Mfg. Co., St. Louis; additional equipment for St. Louis Small Arms Plant	\$1,720,257
Stone & Webster Engineering Corp., New York; designing, constructing and procuring equipment for Volunteer Ordnance Works, Chattanooga, Tenn.	34,245,732

Lease Agreements Signed By Defense Plant Corp.

Washington

• • • The Defense Plant Corp. has announced the following lease agreements, titles to the facilities involved to remain in the DPC:

Allis-Chalmers Mfg. Co., \$1,973,972 for building and equipping plant at West Allis, Wis., for production of marine equipment for Maritime Commission. This commitment is in addition to previous authorization for \$9,066,964 for a plant at Greenfield, Wis., to manufacture bomber equipment.

Vega Airplane Co., \$1,822,713.58 for construction of plant facilities at Burbank, Cal., to manufacture aircraft parts for War Department.

Meisel Gear Co., \$1,682,504.49 for construction and equipping of a plant at Boston—approximately \$803,000 for land and buildings and \$879,504 for machinery and equipment—for production of airplane parts for Navy Department.

Eaton Mfg. Co., Wilcox-Rich Division, \$465,235 for construction and equipping of a plant at Saginaw, Mich.—approximately \$406,700 for land and buildings and \$58,535 for machinery and equipment—to produce aircraft parts for War Department. This commitment will be in addition to previous authorization totaling \$2,312,293 to Eaton Mfg. Co.

Bohn Aluminum & Brass Corp., \$289,102 for construction and equipping of plant at Detroit—approximately \$96,745 for land and buildings and \$192,360 for equipment—for manufacture of aircraft parts for War Department.

Bohn Aluminum & Brass Corp., \$596,463 for plant and equipment at Adrian, Mich.—approximately \$224,836 for land and buildings and \$371,627 for equipment—for manufacture of aircraft parts for War Department.

Romec Pump Co., \$296,854 for construction and equipping plant at Elyria,

AWARDS

Ohio—approximately \$89,200 for land and buildings and \$207,654 for equipment—for production of aircraft equipment, Navy Department.

The RFC also has authorized an additional loan of \$13,000,000 to Willys-Overland Motors, Inc., Toledo, Ohio, to be used in connection with the production of reconnaissance cars for the Army. The Defense Plant Corp. has authorized an increase of \$550,000 in its lease agreement with the Tennessee Powder Co., for its plant at Memphis, Tenn., to provide additional buildings and equipment requested by the War Department. The original authorization was \$26,000,000.

Assembly Line

(CONCLUDED FROM PAGE 66)

gine (the same one introduced last April) will be listed at \$1305. This appears to be the base line from which other prices are figured. It is \$14 more than the price tag that was on the late one-twenty model in 1941. It is \$70 less than the first price announced for the Clipper, and it is \$115 less than the price that was asked for the Clipper late in the 1941 season, after price boosts had gone into effect. On the other hand, an almost identical car with a 6-cylinder engine is offered for \$55 less and the figure thus established (\$1250) is the minimum price on any Packard. It appears to be about \$200 more than Packard's previous minimum. In the more expensive cars, price reductions are approximately \$100 to \$125.

PACKARD'S prices definitely favor the 8-cylinder engine and this is expected to accelerate the sale of the eights at the expense of the sixes. Formerly about twice as many sixes were built as eights, but the present production coming off the Packard line is reversed, with more than twice as many eights as sixes.

Automobile assembly schedules were reduced downward substantially last week to 39,965, compared with 45,525 in the previous week, according to Ward's Reports. This compares with 27,645 in the corresponding week of last year. The low output is the reflection of the model change-over season, but it is also the first indication of scaling down to conform to the curtailment schedule established by the government.

LEE

Quality Springs

ALL SHAPES • ALL SIZES • ALL MATERIALS



LEE SPRING COMPANY, Inc.
30 MAIN STREET BROOKLYN, N.Y.



PERFORATED METALS

INDUSTRIAL and ORNAMENTAL

To produce the highest quality of perforated metal as used in the industrial arts and for ornamentation has been the ambition and persistent endeavor of this company. The highest quality best serves the user. We are here to serve you.

ANY METAL • ANY PERFORATION

The Harrington & King

PERFORATING CO.

5657 FILLMORE STREET—CHICAGO, ILL. New York Office, 114 Liberty Street

PERSONALS . . .

• **Fred H. Haggerson**, vice-president of Union Carbide & Carbon Corp., New York, has been elected a director. He is also president of Union Carbide Co. and of the companies in the Electro-Metallurgical group. He has been identified with the corporation for more than 20 years.

• **Gordon Lefebvre**, general manager, Diesel engine division of American Locomotive Works, Auburn, N. Y., has been named vice-president, general manager and director of the Cooper-Bessemer Corp.

• **E. W. Whiteway**, associated with the Steel Sales Corp., Chicago, since its incorporation in 1915, has been elected vice-president. **George D. Potter**, who has been made assistant secretary, has been with the company since his graduation from Northwestern University in 1935.

• **Elmer W. Pehrson**, who has been identified with the United States Bureau of Mines since 1928, has been made chief of the economics and statistics branch of the bureau.

• **Donald J. Reese**, of the development and research division of International Nickel Co., New York, is scheduled to give a talk on the foundry cupola before the Central New York chapter of the American Foundrymen's Association on Sept. 12 at the Hotel Onondaga, Syracuse.

• **James A. Dubbs**, formerly manager of the Cleveland division of Great Lakes Dredge & Dock Co., has been made vice-president. Mr. Dubbs also has been appointed to the operating board of the Bayonne Dry Dock Association, formed by Great Lakes Dredge & Dock and the Flynn Co., New York, to build the \$10,000,000 dry dock for the U. S. Navy at Bayonne, N. J. He has been connected with the Great Lakes company since 1906.

• **James G. Parks** has joined the staff of American Steel Warehouse Association, Cleveland, as statistician and assistant to **Walter Doxsey**. For the past five years Mr. Parks has been in the standards department of Swift & Co.,



FRED H. HAGGERSON, new director of Union Carbide & Carbon Corp.

Cleveland, where he specialized in cost studies and methods analysis assignments. In Rollins College, from which he was graduated in 1932, Mr. Parks majored in economics and mathematics.

• **Ralph E. Flanders**, president of the Jones & Lamson Machine Co., Springfield, Vt., has been elected a Class B director of the Federal Reserve Bank, Boston, to succeed **Edward S. French**, who has resigned. Mr. Flanders will serve until Dec. 31, 1943.

• **Alden G. Roach** has been elected president of Consolidated Steel Corp., Los Angeles. He succeeds **Donald G. Henderson**, who has become chairman of the board of directors. **Preston Hotchkis** remains chairman of the executive committee. Mr. Roach joined Consolidated upon its formation in 1928, and has been executive vice-president. He is 40 years old.

• **John A. McDonald**, formerly associated with Republic Steel Corp. at Youngstown, has been named assistant blast furnace superintendent at the Hanna Furnace Corp. plant, merchant pig iron division of National Steel Corp., at Buffalo.

• **Robert L. Stevens**, assistant works manager for Bell Aircraft

Corp., Buffalo, since last February, has been named plant engineer. He succeeds **Henry H. Beebe, Sr.**, who has resigned. **George Carson**, who has been with Bell since 1938, succeeds Mr. Stevens.

• **L. W. Wallace**, research and management engineer, has joined the staff of the Trundle Engineering Co. as vice-president. Mr. Wallace was formerly director of engineering and research of the Crane Co., Chicago, and previously held executive positions with Diamond Chain & Mfg. Co., the W. S. Lee Engineering Corp., and the Crane Co. At one time he was executive secretary of the American Engineering Council and director of engineering and research of the Association of American Railroads.

• **Frank R. Burnett**, formerly construction superintendent, Carnegie-Illinois Steel Corp., has been made assistant chief engineer. He joined American Steel & Wire Co., another U. S. Steel subsidiary, in 1916.

OBITUARY...

• **Horace A. Staples**, since 1933, vice-president in charge of engineering of the Phelps Dodge Copper Products Corp., New York, died suddenly of heart disease at his home in Plainfield, N. Y., on Aug. 25. He was 61 years old. For a time he was superintendent of Bridgeport Brass Co. and later became one of the founders of the British-American Metals Co. Mr. Staples was a member of a number of technical societies including the American Society of Mechanical Engineers, American Society for Testing Materials, American Institute of Mining and Metallurgical Engineers and of the American Society for Metals. He was graduated from Pratt Institute in 1902.

• **Durwood B. Walters**, vice-president and general manager of the Chicago Vitreous Enamel Product Co., Chicago, died at the Evanston Hospital, Evanston, Ill., after a long illness on Aug. 18. He was

48 years old. Throughout the past 32 years he had been associated with the porcelain enameling industry. He joined the Chicago company in 1921 as assistant foreman and after holding a number of executive positions was appointed vice-president in charge of sales and service in 1930. Four years later he was made vice-president and general manager.

• **F. W. Robertshaw**, aged 88, retired inventor and industrialist, died Aug. 24 at his home in Pittsburgh. Mr. Robertshaw was the founder of the Robertshaw Thermostat Co., which was originally established in Pittsburgh but which is now located in Youngwood, Pa., with plants in St. Louis and Los Angeles. He invented a highly efficient thermostat in 1899 and in 1907 started its manufacture by his own company. Mr. Robertshaw retired from the presidency in 1928.

• **John Morse**, assistant manager of the San Francisco office of Fairbanks-Morse & Co., Chicago, died in an automobile accident in San Francisco on Aug. 22, aged 25 years. He was a son of Col. Robert H. Morse, president of the company.

• **Irving C. Miller**, an official of the purchasing department of the A. O. Smith Corp., Milwaukee, for the last 10 years, died Aug. 14 in a Milwaukee hospital after a short illness. He was a native of Waterbury, Conn., and went to Milwaukee in 1925. He was 55 years old.

• **Emil Benesch**, former head of the Benesch Scrap & Iron Co., Milwaukee, died Aug. 19 in a hospital there. He came from Austria 55 years ago and shortly after going to Milwaukee organized the firm of which he was the head.

• **Leonard G. Hollingsworth**, an erecting engineer for the Allis-Chalmers Mfg. Co., Milwaukee, for the past 35 years, died in a Milwaukee hospital Aug. 20 at the age of 64 years. He was born in England and served his apprenticeship in London before coming to this country in 1898. He joined Allis-Chalmers in 1906 and was in charge of many large steam turbine and pump installations throughout the country.

• **E. H. McCloud**, vice-president of the Kinnear Mfg. Co., Columbus, Ohio, died at his home in that city after a long illness on Aug. 14. An outstanding fire prevention engineer, he had been connected with the company, which makes fire doors and other safety devices, for 47 years.

• **Roger D. Howell**, assistant plant superintendent of Bliss & Laughlin, Inc., died suddenly of a heart attack at Harvey, Ill., on Aug. 16 at the age of 64. He had been with the company for the past 20 years, and was the brother of Walter R. Howell, the president.

• **Lyndon E. Fox**, superintendent of the General Electric Co., Lynn, Mass., lighting works since 1930 and previously superintendent of the transformer department, died Aug. 19. He had been associated with the company since 1902. He was 60 years old.

• **Frederic Schofield**, supervisor tool department, General Electric Co., Lynn, Mass., for 25 years, died Aug. 19, at the age of 52.

• **Charles C. Lucas**, tool inspector of the White Motor Co. since 1903, died Aug. 27. He was ranked as one of the skilled leaders in Cleveland industrial life.

BRITISH SUB: Inside this British undersea boat is an engineer and friends.

Photo by Fox



CONSTRUCTION STEEL

. . . STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Reinforcing Steel

Awards of 26,900 tons; 18,000 tons in new projects.

AWARDS ATLANTIC STATES

350 Tons, Portland, Me., Mercy Hospital building, to Bancroft-Martin Rolling Mill Co., Portland, Me.; W. J. Lynch, contractor.

220 Tons, Rankin, Pa., Hawkins Village housing program, to Jones & Laughlin Steel Corp., Pittsburgh; Henry Busse, contractor.

100 Tons, Brookline, Mass., municipal court house to Republic Fireproofing Co., New York; through A. Piotti Co., Dorchester, Mass., contractor.

100 Tons, Cambridge, Mass., Massachusetts Institute of Technology laboratory, to Concrete Steel Co., Boston; through Sawyer Construction Co., Boston, contractor.



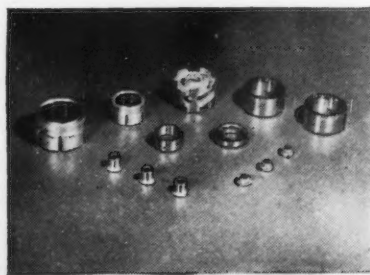
Pouring their Strength into National Defense

Essential parts for gun mounts and aircraft — castings for a host of defense armaments and the machine tools that produce them — are pouring in a steady stream from the AMPCO foundries.

Throughout industry, when metal must withstand excessive wear, the shock of impact, or highly stressed conditions, engineers and tool designers turn to AMPCO METAL and other AMPCO alloys.

Government contractors in ever-increasing numbers are relying on AMPCO for metals of the aluminum bronze class, and other copper base alloys that meet Federal, Army, Air Corps and Association specifications. Write for details of our facilities to supply better bronze alloys.

AMPCO METAL, INC., Dept. IR-94, Milwaukee, Wisconsin



MACHINE TOOLS . . . leading manufacturers standardize on AMPCO METAL because of its stubborn resistance to wear, "squashing out" on shock loads.

AIRCRAFT PARTS . . . a representative group of AMPCO-MADE aircraft parts, all precision machined by AMPCO.

SOUTH AND CENTRAL

9000 Tons, State of Tennessee, fourth quarter requirements of TVA: 2000 tons to Truscon Steel Co., Youngstown, 7000 tons to Tennessee Coal, Iron & Railroad Co., Birmingham.

4000 Tons, Parsons, Kan., shell loading plant, to Sheffield Steel Corp., Kansas City; Kiewit, Paschen & Condon, contractor.

3000 Tons, Norfolk, Va., Navy Yard storehouse, to Bethlehem Steel Co., Bethlehem, Pa.; Rust Engineering Co., contractor.

800 Tons, Childersburg, Ala., pump house for Alabama Ordnance Works, to Truscon Steel Co., Youngstown, through Dravo Corp.

415 Tons, Lawrenceburg, Ind., flood wall, U. S. Engineer, to Laclede Steel Co., St. Louis; Engstrom & Wynn, contractors.

385 Tons, Norfolk, Va., recreation building for Navy, to Truscon Steel Co., Youngstown, through Doyle & Russell.

300 Tons, Des Moines, Iowa, Broadlawn Hospital, to Laclede Steel Co., St. Louis; A. H. Neumann, contractor.

200 Tons, Lyons County, Iowa, paving, to Sheffield Steel Corp., Kansas City.

180 Tons, Decatur County, Iowa, paving to Sheffield Steel Corp., Kansas City.

150 Tons, Grinnell, Iowa, Cowles dormitory, Grinnell College, to Laclede Steel Co., St. Louis; Weitz Co., contractor.

125 Tons, Washington County, Ark., bridge No. 9201, to Jones & Laughlin Steel Corp., Pittsburgh.

102 Tons, Grasmere, Ala., Alabama Ordnance Works, to Truscon Steel Co., Youngstown, through E. I. duPont de Nemours & Co.

WESTERN STATES

481 Tons, Friant, Cal., Central Valley project (Invitation 48,828-A-2), to Columbia Steel Co., San Francisco.

325 Tons, San Diego, Cal., storehouse addition, Navy Supply Depot, to Truscon Steel Co., Los Angeles.

286 Tons, Reno, Nev., gymnasium building for University of Nevada, to Truscon Steel Co., Youngstown, through M. R. Peterson.

218 Tons, Los Angeles, Los Angeles Water and Power Commission (Specification 3876), to Soule Steel Co., Los Angeles.

150 Tons, Coram, Cal., Shasta Dam (Invitation A-33277-A-1), to Columbia Steel Co., San Francisco.

PUERTO RICO

6000 Tons, Puerto Rico, Army base initial requirements, to Bethlehem Steel Co., Bethlehem, Pa.; Arundel-Consolidated Engineering Co., contractor.

PENDING REINFORCING BAR PROJECTS ATLANTIC STATES

1200 Tons, Marietta, Pa., Army supply depot; Braun & Stuart, contractor.

600 Tons, Long Island City, N. Y., Phelps Dodge Corp. plant; Brown & Matthews, contractor.

530 Tons, Brooklyn, Robins Drydock & Repair Co. buildings; C. J. Moore, contractor.

300 Tons, Washington, Naval Research Laboratory expansion; Charles H. Tompkins, contractor.

170 Tons, Princeton, N. J., RCA research laboratory; H. K. Ferguson Co., contractor.

150 Tons, Chicopee Field, Mass., Westover Field, concrete runways.

140 Tons, Springfield, Mass., factory, American Bosch Corp.

140 Tons, East Hartford, Conn., two test houses, Pratt & Whitney Division, United Aircraft Corp.

125 Tons, Brooklyn, Municipal Terminal Market.

100 Tons, South Boston, Mass., Navy Yard garage and fire station.

100 Tons, East Hartford, Conn., government pumping station; Frank T. Wescott, North Attleboro, Mass., contractor.

SOUTH AND CENTRAL

3500 Tons, Carbondale, Ill., shell loading plant, Sherwin Williams Co.; Boyle & Healy Co., contractor.

3500 Tons, Louisiana, Mo., State ordnance depot; Bechtel, McCone & Parsons, contractors.

900 Tons, Columbus, Ohio, general depot, warehouse No. 13.

800 Tons, Moraine City, Ohio, Frigidaire parts assembly plant.

650 Tons, Chicago, Edward Katzinger Co. addition; bids taken.

CONSTRUCTION STEEL

- 500 Tons, Alexandria, Va., Naval torpedo station addition; George Hyman, contractor.
 480 Tons, Detroit, Davidson Avenue viaduct.
 340 Tons, Barberton, Ohio, Columbia Chemical Co. building.
 260 Tons, Norfolk, Va., Naval base recreation building; Doyle & Russell, contractors.
 250 Tons, Wright Field, Ohio, armament laboratory building; F. Messer & Sons, contractors.
 150 Tons, Milwaukee, Kurth Malting Co.
 150 Tons, Fort Crook, Neb., aircraft assembly plant addition.
 120 Tons, Kaukauna, Wis., Thilmany Pulp & Paper Co.
 100 Tons, Muncie, Ind., Delco Remy gear plant.
 100 Tons, Lockland, Ohio, Wright Aeronautical Corp., test laboratory; F. Messer & Sons, contractors.

WESTERN STATES

- 1500 Tons, Remaco, Colo., Remington Arms Co., Inc., small arms plant; Broderick & Gordon, contractors.
 830 Tons, San Francisco, United States Engineer, South Pacific Division (Invitation 34).
 300 Tons, Los Angeles, Pueblo del Rio housing project; R. E. Campbell, Los Angeles, contractor.

Pipe Lines

• **United Gas Pipe Line Co.**, United Gas Building, Houston, Tex., affiliated with United Gas Corp., same address, plans new welded steel pipe line from gas field in southern Louisiana to Mandeville, La., and vicinity, crossing Lake Pontchartrain; from Mandeville to Covington, La., and neighboring district; also line from gas field noted to Gulfport, Miss., about 200 miles in all, for natural gas transmission for municipal, industrial and commercial service in various communities along routes; 14 and 16-in. pipe will be used, lines to have rated capacity of about 80,000,000 cu. ft. per day. Booster stations will be built, with meter and control houses at different distributing points. Cost over \$1,000,000.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Sept. 10 for 5000 ft. of ½-in. galvanized steel pipe, and 2000 ft. of ¼-in. black welded steel pipe (Circular 367).

Pineville Gas Co., Pineville, W. Va., plans natural gas distribution system, including main welded steel pipe line for connection with supply source, control and meter station, and other operating facilities. J. C. Evans is head.

Bureau of Reclamation, Bend, Ore., asks bids until Sept. 15 for welded steel pipe, 10 ft. in diameter, and about 441 ft. long, for Crooked River crossing, north unit Main Canal, near Terrebone, Ore. Pipe line will be supported on structural steel frame and bents, approximately 125 ft. above river bed, to be included in contract. (Deschutes project, Specification 985).

Shell Pipe Line Corp., Shell Building, Houston, Tex., an interest of Shell Oil Co., Inc., same address, plans new welded steel pipe line from point near Henrietta, Tex., where connection will be made with main pipe line system, to Ryan, Okla., about 55 miles, for oil transmission. Pumping stations will be installed for booster service. Cost over \$300,000.

Cast Iron Pipe

Dracut, Mass., has contracted with Layne-Bowler New England Corp., Boston, to draw plans for a water system.

Water Department, Miami, Fla., W. A. Glass, director, plans pipe line extensions and improvements in system, including new main line from pumping station at Hialeah, to replace present old wooden pipe; also new main lines in vicinity of Fiftieth to Sixty-second Streets, and in other districts. Entire project will cost close to \$650,000.

Water Department, Little Rock, Ark., plans new main water pipe line in Pulaski Heights district. Cost about \$80,000; also will convert No. 2 basin at water purification plant for new well storage reservoir, with extensions to

Weekly Bookings of Construction Steel

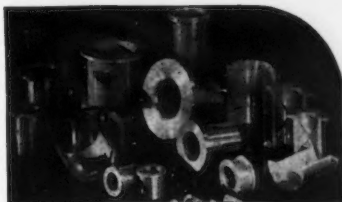
Week Ended	Sept. 2, 1941	Aug. 26, 1941	Aug. 5, 1941	Sept. 3, 1940	Year to Date	
	1941	1941	1941	1940	1941	1940
Fabricated structural steel awards	20,900	10,300	26,700	24,810	965,345	642,835
Fabricated plate awards	575	305	800	450	96,645	110,250
Steel sheet piling awards	0	130	0	175	20,760	31,115
Reinforcing bar awards	26,900	27,700	22,250	7,150	465,195	318,765
Total Letting of Construction Steel	48,375	38,435	49,750	32,585	1,547,945	1,102,965

increase total capacity by 3,500,000 gal. Cost close to \$100,000. Financing has been arranged through Federal aid.

City Commission, Kalamazoo, Mich., Edward S. Clark, city manager, has concluded agreement with Board of Kalamazoo Township

Commissioners for new pipe lines for water system in East Side metropolitan district, totaling about 11 miles. Cost close to \$118,000, to be defrayed by township. About 35 fire hydrants will be installed as part of project. Work will be carried out in fall.

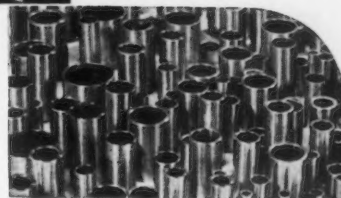
SLEEVE BEARINGS



any TYPE
any SIZE



any QUANTITY



NEW!



Sleeve Bearing Data Sheets for your file folder. Containing a wealth of information for all users of bearings. Write today for your FREE copy.

● Here is the most complete sleeve bearing service in the world! Regardless of the type you require — cast bronze, bronze sheet metal, steel and babbitt or self-lubricating — we can serve you.

And size is no handicap. As small as jewelry — as large as sewer pipes, our facilities are complete in every respect.

Whether you order 1; 100; or 1,000,000, makes little difference. We attach the same sense of responsibility, the same exacting treatment to every order. As manufacturers of every known type, we can give you competent bearing advice free from prejudice. Why not try Johnson Bronze?



JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

505 S. MILL STREET • NEW CASTLE, PA.

Fabricated Steel

Awards of 20,900 tons are more than double those of a week ago; new projects of 25,750 tons are slightly higher; plate lettings call for only 575 tons.

NORTH ATLANTIC STATES

AWARDS

- 1800 Tons, Middlesex County, N. J., Cheesequake Creek bridge, route 35, to Bethlehem Steel Co., Bethlehem, Pa.
800 Tons, Schenectady, N. Y., addition to

turbine building for General Electric Co., to Ingalls Iron Works Co., Pittsburgh plant.

- 400 Tons, Buffalo, buildings for General Drop Forge Co., to R. S. McMannus Steel Construction Co., Inc., Buffalo.
395 Tons, Waterville, Me., State highway bridge, to American Bridge Co., Pittsburgh.
310 Tons, Pittsfield, Mass., extension to General Electric Co. building No. 33, to Lehigh Structural Steel Co., Allentown, Pa.
270 Tons, Becket, Mass., Westfield River State bridge FAGS-17-A(1), to American Bridge Co., Pittsburgh.
255 Tons, Rochester, N. Y., crane runway addition, for Delco Appliances Division, General Motors Corp., to American Bridge Co., Pittsburgh.

- 160 Tons, Kendaia, N. Y., building for Seneca Ordnance Depot, to R. S. McMannus Steel Construction Co., Inc., Buffalo.
120 Tons, Buffalo, building for American Brass Co., to R. S. McMannus Steel Construction Co., Inc., Buffalo.
110 Tons, Niagara Falls, N. Y., laboratory for Electro Metallurgical Co., to Bethlehem Steel Co., Lackawanna, N. Y.
100 Tons, Waterbury, Conn., Connecticut Light & Power Co. gas generating plant to Berlin Construction Co., Berlin, Conn.

THE SOUTH

- 550 Tons, Corpus Christi, Tex., hangar for Navy, to Ingalls Iron Works Co., Birmingham.
380 Tons, Miami, Fla., Biscayne Causeway, bascule span, Dade County, to American Bridge Co., Pittsburgh.

CENTRAL STATES

- 4900 Tons, Dearborn, Mich., foundry building, Rouge plant, for Ford Motor Co., to American Bridge Co., Pittsburgh.
950 Tons, Connell, Kan., Boeing Airplane Co.: 650 tons for warehouse, 300 tons for plant addition, to Kansas City Structural Steel Co., Kansas City, Kan.
397 Tons, Medora, N. D., State highway bridge, to Bethlehem Steel Co., Bethlehem, Pa.

WESTERN STATES

- 7000 Tons, Salt Lake City, Utah, small arms plant for Remington Arms Co., to an Eastern fabricator.
540 Tons, Bonneville, Ore., 16 power house inlet gates (Invitation 59), to Willamette Iron & Steel Corp., Portland, Ore.
500 Tons, Granby, Colo., tunnel supports for Colorado-Big Thompson project (Invitation C-46,061-A), to Commercial Shearing & Stamping Co., Youngstown, Ohio.
475 Tons, Earp, Cal., roof framing, Parker power plant (Specification 1540-D), to American Bridge Co., Pittsburgh.
400 to 500 Tons, Arden, Nev., Blue Diamond Corp. wallboard plant, to Consolidated Steel Corp., Los Angeles.

PENDING STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

- 2500 Tons, Bellevue, D. C., heavy materials storehouse, Naval magazine, for Bureau of Yards and Docks.
1650 Tons, Philadelphia, new optical shop, buildings Nos. 108 and 109, for Army.
1400 Tons, Tonawanda, N. Y., aviation engine plant for Chevrolet Motors division.
1000 Tons, Springfield, Mass., American Bosch Co. plant.
805 Tons, Bridgeport, Conn., emergency plant facilities for Bridgeport Brass Co.
340 Tons, Ellicott City, Md., building for Doughnut Corp. of America.
320 Tons, Solvay, N. Y., steam generating plant for Solvay Process Co.
310 Tons, Sandy Hook, N. J., beams and trusses, Fort Hancock, for U. S. Engineer's Office.
230 Tons, Rochester, N. Y., Bausch & Lomb Co. foundry building.
170 Tons, Syracuse, N. Y., factory addition for Easy Washing Machine Co.

THE SOUTH

- 12,000 Tons, Marion, Okla., Midwest air depot for War Department.
220 Tons, Richmond, Va., distributing station for General Baking Co.

CENTRAL STATES

- 2100 Tons, Chicago, superstructure, South Canal Street, bascule bridge.
1800 Tons, Grand Detour, Ill., State highway bridge, route 2, section 39-RF, Rock River.
480 Tons, Hamilton County, Ohio, three bridges.
412 Tons, Cincinnati, grade crossing, Federal project No. FAGM 68-A(1); bids Sept. 9.

FABRICATED PLATES

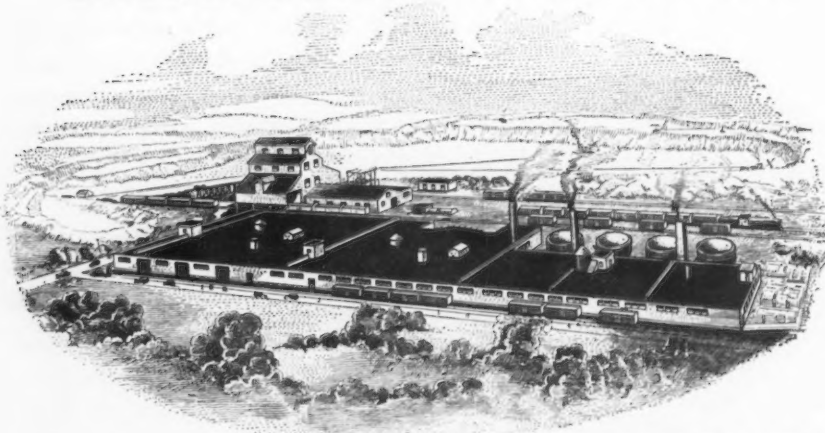
AWARDS

- 575 Tons, Wood River, Ill., 12 tanks for Shell Oil Co., to Graver Tank & Mfg. Co., East Chicago, Ind.



GOOSE LAKE

*Fire Clay and
Fire Clay Flour
Fire Clay Brick
Therm-O-Flake Insulation*



Goose Lake Clay Deposit with Clay Grinding and Fire Brick Plant



JOLIET, ILL.

NON-FERROUS METALS

... MARKET ACTIVITIES AND PRICE TRENDS

OPA Clarifies

Copper Schedule

The price schedule for copper was amended early this week, adding an exact specification for Lake copper and making the same differentials applicable to Lake copper as are provided for electrolytic copper, it was announced by the new Office of Price Administration.

Designed to clear up the status of Lake copper under the price schedule, the amendments also place casting copper on an f.o.b. refinery basis, instead of a delivered Connecticut Valley basis, thus recognizing prevailing industry practice and preserving the differential between electrolytic and casting coppers. Also, dealers are permitted to seek OPA permission to complete less than carload lot sales at higher than ceiling prices where the copper involved was purchased in carload lots prior to July 1, but was delivered on or after that date.

OPA explained that before the issuance of the copper price schedule, Lake copper sold at a small premium over electrolytic copper in the Connecticut Valley and at a slight discount below electrolytic copper in the midwest areas. By placing electrolytic and Lake copper on the same basis at all points, OPA said, operation of the OPM priorities covering copper was facilitated.

Official OPACS action, granting a 1c. a lb. premium above out-of-pocket costs is expected for high cost Michigan copper output, with the provision, requested by OPM, that basic wages for copper workers will be increased \$1 a day. The price to be allowed, it was stated, will be based on the average cost of production for the first six months.

Large lead tonnages are arriving monthly from Peru, Canada, Mexico, and Australia, and the supply situation seems to be getting a little better. Consumers, however, have been hard pressed for new supplies of the metal because of the lag in distribution of the incoming lead. A meeting yesterday of the OPM industry advisory

sory committee was expected to consider the September lead allocations for the Metals Reserve Co.

Moderate tin tonnages are being released from MRC stockpiles to alleviate the tightness in this metal for prompt and September deliveries. While OPM announced that tin would be released in restricted amounts to provide for bona fide requirements, the demands have been very much less than had been anticipated.

Non-Ferrous Prices

(Cents per lb. for early delivery)

Copper, Electrolytic ¹	12.00
Copper, Lake	12.00
Tin, Straits, New York	52.00
Zinc, East St. Louis ²	7.25
Lead, St. Louis ³	5.70

¹ Mine producers' quotations only, delivered Conn. Valley. Deduct 1/4c. for approximate New York delivery price. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Steel Uses 30,000 Tons Of Aluminum Yearly

... Steel producers need about 30,000 tons of aluminum per year at the present rate of operations, chiefly to deoxidize and purify molten steel. No thoroughly satisfactory substitutes for aluminum in steelmaking are available in sufficient quantities.

About 2000 tons of the aluminum required must be 99 per cent pure aluminum, while the remainder can be an alloy containing 82.5 to 90 per cent aluminum and also small amounts of copper, zinc, silicon and magnesium, according to the American Iron and Steel Institute.

The pure aluminum is needed to remove unwanted oxygen from certain very high grade steels widely used for defense purposes.

WHAT WOULD IT COST YOU TO MAKE CHUCK JAWS TO HOLD THIS PIECE ?

To make chuck jaws to hold this die cast brass part by the usual fitting and filing methods would be a slow, tedious task. And for most purposes the cost would be prohibitive. Yet you can produce durable chuck jaws of extreme accuracy for this job, using the CERROMATRIX METHOD, for less than ten dollars—total cost of material and labor. This sound, workmanlike process of making chuck jaws makes it economical to use them on many operations

previously forbidden because of their relatively high cost. The increased availability of chuck jaws produced by the Cerromatrix Method makes it possible to improve the speed and accuracy of many machining operations where the same part is made in quantity. The process is described in detail in a new illustrated folder, together with several other interesting jobs. Send for it today.



SEND FOR THIS FOLDER TODAY



CERRO DE PASCO COPPER CORPORATION
40 WALL STREET NEW YORK, N. Y.
BRITISH ASSOCIATES: MINING & CHEMICAL PRODUCTS LTD., LONDON
CANADIAN DISTRIBUTORS: DOMINION MERCHANTS LTD., MONTREAL

MACHINE TOOLS

... SALES, INQUIRIES AND MARKET NEWS

Revision of Tool Orders Seen Giving Some Relief

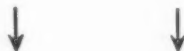
Cleveland

• • • Machine tool producers here have found some relief in the congestion of orders by some general downward revisions of old orders and the forward movement of delivery dates. The rearrangement of delivery dates has been undertaken by producers in instances where it was apparent that the equipment ordered was not actually required at the time specified. This is being done with the approval of defense officials and little protest from buyers when they are plainly faced with the fact that their delivery dates are much too early.

This easing of some delivery pressure and the producers' pool has smoothed deliveries to many defense plants. There are so many A-1-A ratings assigned to machine tool orders that federal officials have resorted to designat-

ing some special orders in that category as "urgent" when swift delivery is required. Most such orders are filled from the producers' pool.

Orders continue to come in at a heavy rate on the heels of the many shell awards that have been made in recent weeks and most producers are fully booked through next March, with some plants only taking orders for July delivery. No movement of new machine tools to Russia seems to be under way, and some observers believe that, if and when, the defense authorities order such shipments, the units will come out of the pool.



New Defense Plant Opened

Chicago

• • • A notable addition to machine tool capacity in this district is the War Department Emergency Plant operated by Giddings &

Lewis Machine Tool Co., Fond du Lac, Wis. This plant was officially opened Aug. 27 with the first machine ready for delivery, although it has been operating since late spring. The plant, including equipment, cost \$10,000,000. Here the largest sizes of G&L horizontal boring, drilling and milling machines are produced. This addition, plus the expansion of the regular company plant have combined to triple production on these important machines.

Typical of the speed with which the industry is moving is the fact that the War Department plant was started in January and operation was attained in May. With deliveries on new equipment moving back opening dates of several important defense plants in this area, and with such offices as Defense Contract Service urging firms to use all and any type of machine tool available, used machinery sales still are steady, though choice items became scarce months ago.

Tool Output Boost Seen Due to Use of More Shifts

Washington

• • • Recent expansion of machine tool production has resulted from the enlargement of plant facilities and increased utilization of second and third shifts rather than by increased overtime, according to a survey undertaken by the Bureau of Labor Statistics at the request of the Office of Production Management. Practically all companies covered by the survey were working on multiple-shift schedules with widespread use of overtime. Six full days of operation during the week were customary among the plants included in the survey, Sunday generally being reserved for maintenance work. The survey was restricted to the larger plants in the industry. The 85 plants included in the preliminary summary employed 70,300 wage earners in June, 74 per cent of the estimated total for the industry.

In response to an inquiry as to what considerations prevented further expanding capacity by

operating second and third shifts with forces as large as the main shift, replies from 61 plants indicated that they had encountered shortages of skilled workers, 24 plants were held up by shortages of supervisory personnel, 20 plants reported difficulties in securing sufficient materials, parts and supplies, 11 plants had inadequate equipment and six plants stated that legal restrictions affected their operating schedules. Eight plants employing 20,200 wage earners indicated that they were operating their shifts at the maximum with present facilities. In these 8 plants, 42 per cent of the workers were employed on the second and third shifts.

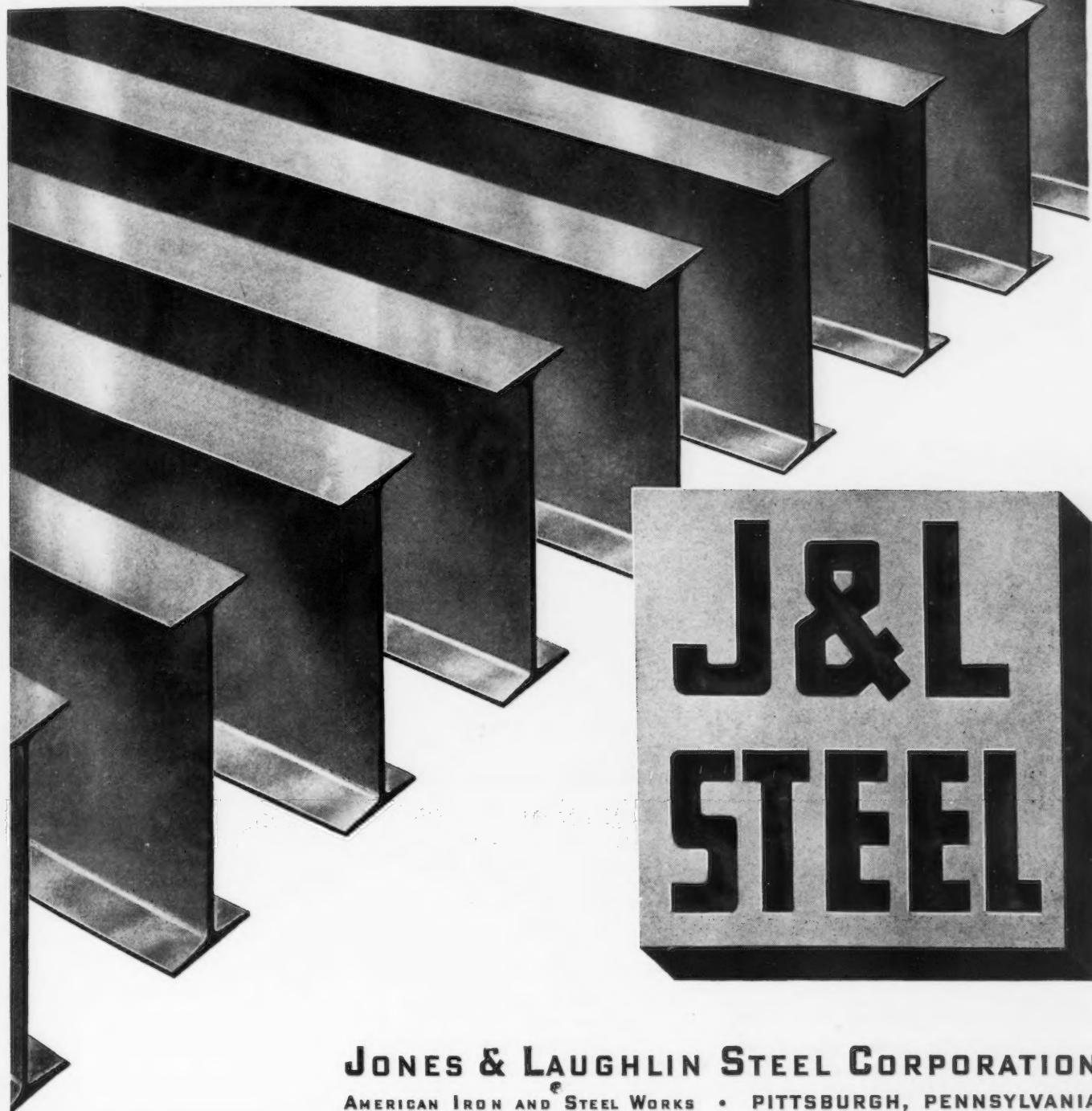
From the middle of 1938 to the end of 1940 both employment and average hours worked in machine tool plants showed an almost uninterrupted increase. Since the beginning of 1941, however, average hours worked in the industry have shown a tendency to level off at around 52 hours per week, in-

dicating that a peak has been reached in average hours of employment per worker.

Distribution of all workers in the 85 plants by shift shows 68.6 per cent working on the main shift, 24.6 per cent on the second, and 6.8 per cent on the third shift. Any analysis of the extent of utilization of plant facilities based on the ratio of employment on the various shifts must take into account the various factors governing operations in machine tool plants. For instance, in many of the surveyed plants, all productive machines were running full time with the same number of operators on each shift. In these plants, however, 60 per cent or more of the total plant force was engaged on the main shift, the preponderance of workers on this shift resulting from the operations of assembly, maintenance and supply units which, on one shift per day, keep pace in most instances with continuous operation of production departments.

CONTROLLED QUALITY JUNIOR BEAMS

Strong—economical—light-weight steel I-Beams for reducing dead load in floors and roofs of factories, hangars, cantonment buildings, housing projects and other light-occupancy structures.



JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS • PITTSBURGH, PENNSYLVANIA

SCRAP

... MARKET ACTIVITIES AND PRICE TRENDS

Lull In Shipments Of Scrap Reported

... Whether the holiday was over for the scrap trade this week, as officials proclaimed, was an open question at the time of going to press, but at any rate a lull in shipments set in following the Sept. 2 deadline proclaimed by OPA for strict adherence to ceiling prices. The brief period of comparative freedom in which prices exceeded the official maximum was said to be over, while ahead of the trade is pending a mandatory priority order on scrap, which is viewed as an attempt to bolster the OPA system of ceiling quotations.

So far, scrap interests and mill buyers have had dinned at them so many threats of sanctions against violators, that the warnings have become monotonous. In this respect the Aug. 27 meeting at Washington was reminiscent of previous gather-

ings and equally disappointing to dealers. Leon Henderson asserted at the meeting that ceiling prices had been widely ignored and threatened to invoke "all necessary sanction" to insure adherence to price schedules and assure adequate supplies. He outlawed, after Sept 2, the cleaning up of old contracts in excess of the established maximums.

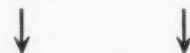
Priorities alone would not improve the supply question, pointed out experts in major consumption centers. Meanwhile, the usual large inventories built up each fall at consuming plants as a hedge against cold weather are lacking.

One large eastern buyer early this week reduced its buying prices to conform with the maximums and two large brokers did likewise, but the brokers reported they were not able to buy as much material as usual and seriously doubted if they could achieve the average of recent weeks. The reversion to the ceilings

could not be confirmed, on Tuesday, as being market wide.

The OPM has extended its automobile salvaging program to the Chicago, St. Louis and Kansas City areas in its effort to recover 1,000,000 tons, and perhaps more, of iron and steel scrap. At meetings in the three cities government officials will appeal to auto wreckers and scrap dealers, as has been done in New England and Ohio. The Chicago meeting was scheduled for Wednesday, the St. Louis meeting for Thursday at the Statler Hotel and the Kansas City meeting for Friday at the Muehlbach Hotel.

An estimated 200,000 tons of publicly owned steel rails were made the object of a WPA salvaging program. State WPA administrators were directed to give the operations first priority. Scrap salvaged under the program, according to arrangements drawn up with OPM, will be shipped, charges collect, to a steel mill or other consumer designated by OPM. After deducting transportation cost, the steel company consignee will then send the city a check based on the maximum mill price for the material fixed by OPA.

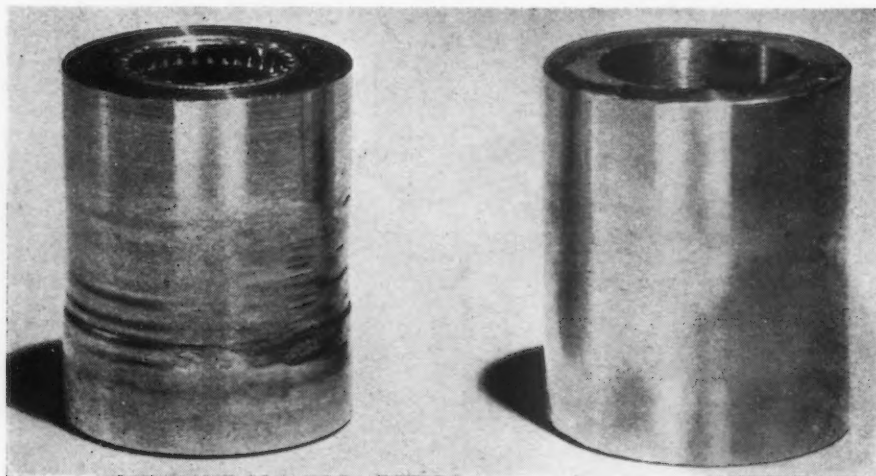


Scrap Institute Urges Observance of OPACS Prices

Washington

... Dealers and all handlers of iron and steel scrap were urged by the board of directors of the Institute of Scrap Iron and Steel at a meeting last week to immediately refuse to take or accept any business at prices above the established government price schedule and to do everything possible to keep scrap rolling to the mills and foundries.

In announcing the decision of the special board meeting, Edwin C. Barringer, executive secretary, said on behalf of the institute that the iron and steel scrap industry had made recommendations to OPACS in the past that would accelerate the flow of scrap and would gladly take advantage of an invitation extended at the joint meeting to help iron out existing inequalities so that the defense program would not be impeded.



Better than 9 to 1 Increase In Life of Steel Mill Guide Rolls!

A hardened tool steel guide roll shown at left is badly worn after only 10 days' operation. At the right you see a guide roll cast from "Coast Metal" which still has a good surface after 90 days' operation.

You can effect economy by using

"Coast Metals" Hard-Surfacing castings or weld rods for maintenance of mill equipment to secure much longer life and reduction in replacement shut-downs.

Desirable territories for distribution of Coast Metals are available.

COAST METALS, Inc. 1006 McKinley Ave. S. W.
CANTON, OHIO

Wickwire Spencer Asks For Scrap In Ad

Boston

• • • Threatened with a curtailment of operations within a few days, the Wickwire Spencer Steel Co., Palmer, Mass., in a full page advertisement in a local weekly paper, said: "Wickwire Spencer will pay for every pound of steel scrap collected. The dealers are serving in their usual capacity in collecting the scrap and Wickwire Spencer will buy the scrap from the dealer after it is accumulated. Proceeds from any scrap you wish to donate will be turned over to the United Service Organization."

The advertisement listed in detail the types of scrap wanted.

OPACS Alters Scrap Schedule, Cincinnati Now a Basing Point

Washington

• • • Establishment of Cincinnati as a basing point for scrap steel, revision of shipping point prices for Gulf ports and changes in prices of rerolling rails were announced by OPACS last week in a series of amendments to the scrap iron and steel price schedule.

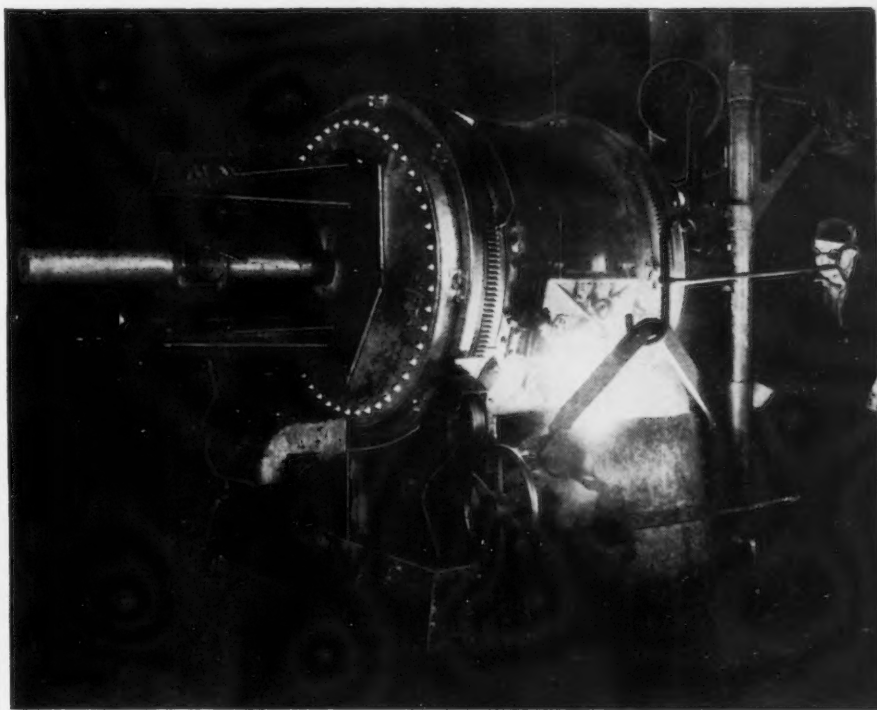
The Cincinnati prices, which include the switching district of Newport, Ky., are identical with the prices previously established for Portsmouth, Middletown and Ashland, with the one exception of east iron borings. Borings at Cincinnati are put at \$15, the same as Middletown. Ashland and Portsmouth, however, may buy borings at \$15.25.

The amendment covering Gulf Port prices states that scrap shipped from Tampa, Pensacola, Gulfport, Mobile, New Orleans, Lake Charles, Port Arthur, Beaumont, Galveston, Texas City, Houston and Corpus Christi has a maximum shipping point price not exceeding \$14 a gross ton, f.o.b. cars, for No. 1 heavy melting steel. Price differentials for other grades at those ports are to be the same as those applying at Birmingham.

These new prices are apparently designed to stimulate the collection of scrap in this area, yet at the same time maintain domestic and export prices at a parity.

Railroads not operating in a basing point may now sell rerolling rails f.o.b. their lines at the average price of their sales in the period from Sept. 1, 1940, to Jan. 31, 1941, according to the new amendments. Rerolling mills are now permitted to absorb all transportation charges necessary to obtain the rail. This change, as with past rulings, applies to rerolling mills only, as it is not permitted to divert rails of rerolling quality for melting purposes.

Portsmouth, Ohio—An increase in the flow of scrap to the Portsmouth plant of the Wheeling Steel Corp. makes it possible for this unit to increase its active open hearths this week to nine furnaces. On July 27, because of the lack of sufficient scrap, this company was forced to reduce its steel output and for the past five weeks has been running only eight furnaces. Output of the rod and wire mill of this company has also been a trifle cramped because of the lack of sufficient steel. With the flow of material a trifle better, it is anticipated that production in the rod and wire mill will be up.



Greater Production • Better Control

The DETROIT Furnace is a fast melting unit. It produces a large number of heats large or small in rapid succession all day long. It is thereby very efficient—also flexible and adaptable to the foundry needs for molten metal. The quality of the product is second to none. For close chemical and metallurgical control the DETROIT Furnace with its exclusive, automatic stirring action under non-oxidizing conditions, simply cannot be beaten.

But don't take our word for these claims—find out for yourself. Let us arrange for you to see a few of these furnaces in operation and talk to their owners yourself. Get the low-down first hand from those who know. Write for further facts today.

DETROIT
ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY
BAY CITY, MICHIGAN

Iron and Steel Scrap (other than railroad scrap)

(Maximum basing point prices as revised by OPACS to Aug. 26, 1941, from which shipping point prices and consumers' delivered prices are to be computed, per gross ton)

Basing Points ➡	Pittsburgh	Johnstown	Weirton	Steubenville	Youngstown	Warren	Sharon	Canton	Chicago	Kokomo	Bethlehem	Claymont	Coatesville	Phoenixville	Harrisburg	Sparrows Point	Buffalo	Cleveland	Toledo	Cincinnati*	Portsmouth	Middletown	Ashland	St. Louis	Detroit	Duluth	Min'apolis**	Birmingham	Chattanooga	Radford, Va.	Worcester	Bridgeport	Philipsdale, R. I.	Los Angeles	San Francisco	Seattle	Portland	Minneapolis						
▼ GRADES																																												
No. 1 heavy melting	\$20.00	\$20.00		\$18.75	\$18.25	\$18.25	\$18.75		\$18.75	\$19.25	\$19.50		\$19.50	\$17.50	\$17.85	\$18.00	\$17.00			\$19.50	\$17.50	\$17.85	\$18.00	\$17.00												14.50	14.50	14.50	14.50	14.50				
No. 1 hyd. comp. black sheet	20.00	20.00		18.75	18.25	18.25	18.75		18.75	19.25	19.50		19.50	17.50	17.85	18.00	17.00			19.50	17.50	17.85	18.00	17.00											14.50	14.50	14.50	14.50	14.50					
No. 2 heavy melting	19.00	19.00		17.75	17.25	17.25	17.75		17.75	18.25	18.50		18.50	16.50	16.85	17.00	16.00			18.50	16.50	16.85	17.00	16.00												13.50	13.50	13.50	13.50	13.50				
Dealers' No. 1 bundles	19.00	19.00		17.75	17.25	17.25	17.75		17.75	18.25	18.50		18.50	16.50	16.85	17.00	16.00			18.50	16.50	16.85	17.00	16.00												13.50	13.50	13.50	13.50	13.50				
Dealers' No. 2 bundles	18.00	18.00		16.75	16.25	16.25	16.75		16.75	17.25	17.50		17.50	15.50	15.85	16.00	15.00			17.50	15.50	15.85	16.00	15.00												12.50	12.50	12.50	12.50	12.50				
Mixed borings and turnings	15.25	15.25		14.00	14.25	13.50	14.00		14.00	14.50	14.75		14.75	12.75	13.10				13.10	14.75	12.75	13.10		12.25												9.75	11.75	11.75	11.75	11.75				
Machine shop turnings	15.50	15.50		14.25	14.50	13.75	14.25		14.25	14.75	15.00		13.35	15.00	13.00	13.35	15.50	15.00		15.00	13.00	13.35	15.50	15.00											10.00	12.00	12.00	12.00	12.00					
Shoveling turnings	16.50	16.50		15.25	15.50	14.75	15.25		15.25	15.75	16.00		14.35	16.00	14.00	14.35	16.50			16.00	14.00	14.35	16.50													11.00	13.00	13.00	13.00	13.00				
No. 1 busheling	19.50	19.50		18.25	17.75	17.75	18.25		18.25	18.75	19.00		19.00	17.00	17.35	17.50	16.00			19.50	17.00	17.35	17.50	16.00													14.00	16.00	16.00	16.00	16.00			
No. 2 busheling	15.50	15.50		14.25	13.75	13.75	14.25		14.25	14.75	15.00		15.00	13.00	13.35	13.50	12.50			15.00	13.00	13.35	13.50	12.50													10.00	12.00	12.00	12.00	12.00			
Cast iron borings	15.75	15.75		14.50	14.00	14.00	14.50		14.50	15.00	15.25		13.60	15.25	13.25	13.60	13.75	12.75		13.60	15.25	13.25	13.60	13.75	12.75												10.25	12.25	12.25	12.25	12.25			
Uncut structural, plate scrap	19.00	19.00		17.75	17.25	17.25	17.75		17.75	18.25	18.50		18.50	16.50	16.85	17.00	16.00			19.00	16.50	16.85	17.00	16.00													13.50	15.50	15.50	15.50	15.50			
No. 1 cupola	21.00	21.00		20.00	20.00	22.50	23.00		21.50	21.00	18.50	20.50		19.50	18.50	18.85	17.50	18.50		21.00	20.00	20.35	*19.00	20.00	20.50	21.00	20.00											18.00	20.00	20.00	20.00	20.00		
Heavy breakable cast	19.50	19.50		18.50	18.50	21.00	21.50		21.00	18.50	20.50		19.50	18.50	18.85	17.50	18.50		19.50	18.50	18.85	*17.50	18.50		20.50	21.00	20.00											17.00	19.00	19.00	19.00	19.00		
Stove plate	19.00	19.00		17.00	16.00	18.00	18.50		18.00	19.00	18.00		15.60	17.50	17.00	14.10	*16.00	17.00	17.50		17.50	17.00	14.10	*16.00	17.00	17.50	18.00											14.00	16.00	16.00	16.00	16.00		
Low phos. billet, bloom crops	25.00	25.00		23.75	23.75	23.25	23.75		23.75	24.25	24.50		23.50	22.50	22.85	23.00	22.00			23.50	22.50	22.85	23.00	22.00															19.50	21.50	21.50	21.50	21.50	
Low phos. bar crops, smaller	23.00	23.00		21.75	21.75	21.25	21.75		21.75	22.25	22.50		21.50	20.50	20.85	21.00	20.00			21.50	20.50	20.85	21.00	20.00															19.50	21.50	21.50	21.50	21.50	
Low phos. pu'ch'gs., plate scrap ¹	24.75	23.00		21.75	21.75	21.25	21.75		21.75	22.25	22.50		21.50	20.50	20.85	21.00	20.00			21.50	20.50	20.85	21.00	20.00															17.50	19.50	19.50	19.50	19.50	
Machinery cast, cupola size ²	22.00	22.00		21.00	21.00	23.50	24.00		23.50	21.00	23.00		22.00	21.00	21.35	*20.00	21.00	21.50		22.00	21.00	21.35	*20.00	21.00	21.50	22.00													19.00	21.00	21.00	21.00	21.00	
No. 1 mach. cast, drop-broken, 150 lb. and under	22.50	22.50		21.50	21.50	24.00	24.50		24.00	21.50	23.50		22.50	21.50	21.85	20.50	21.50		22.50	21.50	21.85	20.50	21.50	22.00	22.50														19.50	21.50	21.50	21.50	21.50	
Clean auto cast	22.50	22.50		21.50	21.50	24.00	24.50		24.00	21.50	23.50		22.50	21.50	21.85	20.50	21.50		22.50	21.50	21.85	20.50	21.50	22.00	22.50														19.50	21.50	21.50	21.50	21.50	
Punchings and plate scrap ³	23.75	22.00		20.75	20.75	20.25	20.75		20.75	21.25	21.50		20.50	19.50	19.85	20.00	19.00			20.50	19.50	19.85	20.00	19.00															16.50	18.50	18.50	18.50	18.50	
Punchings and plate scrap ⁴	22.75	21.00		19.75	19.75	19.25	19.75		19.75	20.25	20.50		19.50	18.50	18.85	19.00	18.00			19.50	18.50	18.85	19.00	18.00															15.50	17.50	17.50	17.50	17.50	
Heavy axle, forge turnings	21.25	19.50		18.25	18.25	17.75	18.25		18.25	18.75	19.00		18.00	17.00	17.35	17.50	16.50			18.00	17.00	17.35	17.50	16.50																14.00	16.00	16.00	16.00	16.00
Medium h'vy. el. f'ce. turnings	19.75	18.00		16.75	16.75	16.25	16.75		16.75	17.25	17.50		16.50	15.50	15.85	16.00	15.00			16.50	15.50	15.85	16.00	15.00															12.50	14.50	14.50	14.50	14.50	

¹ This grade is 3/4-in. and heavier, cut 12 in. and under. ² May include clean agricultural cast. ³ Under 3/4 to 1/4-in., cut 12 in. and under. ⁴ Under 1/4-in. to No. 12 gage, cut 12 in. and under. ⁵ Youngstown, Warren, Sharon and Canton are not basing points on this grade. ⁶ Middletown and Cincinnati price for this grade is \$15. * Includes Newport, Ky. ** Minneapolis and St. Paul are basing points on following grades only: No. 1 cupola, heavy breakable cast, stove plate, machinery cast cupola size, No. 1 machinery cast drop broken, clean auto cast.

Railroad Scrap (Per gross ton, delivered consumers' plants located on line of railroad originating scrap)

Where the railroad originator of the scrap operates in two or more of the basing points named, the highest of the maximum prices established for such basing points shall be the maximum price of the scrap delivered to a consumer's plant at any point on the railroad's line, except that switching charges of 84c. per gross ton shall be subtracted from the maximum prices of scrap originating from railroads operating in Chicago and sold for consumption outside Chicago.

	Basing Points ➤																							
▼ GRADES	Pittsburgh	Sharon, Pa.	Wheeling	Steubenville	Youngstown	Canton	Chicago	Kokomo	Philadelphia	Wilmington	Sparrows Point	Cleveland	Buffalo	Portsmouth	Middletown	Ashland	St. Louis	Kansas City	Detroit	Duluth	Birmingham	Los Angeles	San Francisco	Seattle
No. 1 heavy melting	\$21.00	\$19.75	\$19.25	\$19.75	\$19.75	\$19.75	\$20.50	\$20.25	\$20.50	\$18.50	\$17.00	\$18.85	\$19.00	\$18.00	\$17.50	\$17.00	\$17.00	\$18.85	\$19.00	\$18.00	\$15.50	.....	.....
Scrap rails	22.00	20.75	20.25	20.75	20.75	20.75	21.50	21.25	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	
Rerolling rails*	23.50	22.25	21.75	22.25	22.25	22.25	23.00	22.75	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	
Scrap rails 3 ft. and under	24.00	22.75	22.25	22.75	22.75	22.75	23.50	23.25	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	23.50	
Scrap rails 2 ft. and under	24.25	23.00	22.50	23.00	23.00	23.00	23.75	23.50	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	23.75	
Scrap rails 18 in. and under	24.50	23.25	22.75	23.25	23.25	23.25	24.00	23.75	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	

* Relaying quality \$5 higher. Railroads not operating in a basing point may sell rerolling rails f.o.b. their lines at average price of their sales from Sept. 1, 1940, to Jan. 31, 1941. Rerolling mills may absorb all transportation charges necessary to obtain such rails.

Explanatory Notes

(A basing point includes its switching district.)

MAXIMUM PRICE at which any grade of scrap may be delivered to consumer's plant, wherever located, is the shipping point price, plus actual transportation from the shipping point to consumer. Where shipment is by water, actual handling charges at the dock of not more than 75c. a gross ton may be included as part of transportation charges. In no case may this maximum price exceed by more than \$1 prices (for material other than railroad scrap) for the basing point nearest the consumer.

COMPUTING SHIPPING POINT PRICE: A shipping point is the point from which the scrap is to be shipped to a consumer. A shipping point price is computed as follows: (a) For Shipping Points located within a basing point.—The price established for the basing point in which the shipping point is located, is determined. Then deduct from this the actual costs involved in transporting scrap from the shipping point to the consumer's plant within the basing point which is nearest, in terms of transportation costs, to the shipping point; (b) For shipping points located outside a basing point.—The price established for the nearest basing point, in terms of transportation charges, to the shipping point is determined. Deduct from this the lowest established charge for transporting scrap from the shipping point to such basing point. **Exceptions:** (1) The shipping point price at any shipping point in New England, of those grades of scrap for which no prices are listed above shall be the Johnstown basing point price, minus the all-rail transportation costs from

the New England shipping point to Johnstown; (2) Shipping point prices for New York City, Brooklyn, New York, and New Jersey shall be computed from the Bethlehem, Pa., basing point.

GULF PORT PRICES: Scrap shipped from Tampa, Pensacola, Gulfport, Mobile, New Orleans, Lake Charles, Port Arthur, Beaumont, Galveston, Texas City, Houston and Corpus Christi, has a maximum shipping point price not exceeding \$14 a gross ton, f.o.b. cars, for No. 1 heavy melting steel. For other grades, the differentials established for Birmingham apply.

REMOTE SCRAP: Material located beyond the zone from which the railroad freight rate to Pittsburgh is \$11.20 is called remote scrap. Consumers desiring to purchase such scrap, but unable to do so without exceeding the ceiling prices, may make application to OPACS for permission to absorb the excess freight charges.

UNPREPARED SCRAP: Regardless of source, maximum price of unprepared scrap is \$2.50 less than maximum for corresponding grade of prepared scrap.

BILLET AND BLOOM CROPS: Where such material originates in the Pittsburgh basing point, it may be sold delivered to a consumer within or without the Pittsburgh point at the price given in Schedule A, plus not more than \$2.50 in transportation charges. Lowest established transportation charges will govern.

Non-Ferrous Scrap

(Dealers buying prices, cents per lb.)

	New York	Philadelphia	Pittsburgh	Cleveland	Detroit	Chicago
No. 1 heavy copper	*10.00	*10.00	*10.00	*10.00	*10.00	*10.00
Light copper	* 8.00	* 8.00	* 8.00	* 8.00	* 8.00	* 8.00
Heavy yellow brass	6.50-6.75	*6.25	7.50-8.00	5.75-6.25	7.00-7.25	7.00-7.50
Light brass	5.75-6.00	*5.50	7.25-7.50	6.00-6.50	6.50-6.75	7.00-7.25
No. 1 comp. turnings	9.50-9.75	*7.75	*9.50-9.75	8.50-9.00	9.00-9.25	9.00-9.25
New yellow brass clips	8.00-8.25	8.50-9.00	7.75-8.00	8.00-8.50	7.50-8.00	7.75-8.25
Soft lead	5.25-5.50	5.00-5.25	4.75-5.00	4.75-5.00	5.00-5.25	4.75-5.00
Old zinc	4.00-4.25	4.25	4.25-4.50	4.00-4.25	4.50-4.75	4.50-5.00
Cast forged aluminum	*11.00	*11.00	*11.00	*11.00	*11.00	*11.00
Old sheet aluminum	*11.00	*11.00	*11.00	*11.00	*11.00	*11.00
Solder joints	8.75-9.00	9.00	7.50-8.00	6.50-6.75	5.50-6.00	7.50-8.00
No. 1 pewter	36.00-37.00	35.00-36.00	31.00-32.00	32.50-34.00	37.50-38.50	32.00-34.00

... Comparison of Prices

(Advances Over Past Week in **Heavy Type**; Declines in *Italics*)

(Prices Are F.O.B. Major Basing Points)

	Sept. 2, 1941	Aug. 26, 1941	Aug. 5, 1941	Sept. 3, 1940
Flat Rolled Steel: (Cents Per Lb.)				
Hot rolled sheets.....	2.10	2.10	2.10	2.10
Cold rolled sheets.....	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip.....	2.10	2.10	2.10	2.10
Cold rolled strip.....	2.80	2.80	2.80	2.80
Plates.....	2.10	2.10	2.10	2.10
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate.....	\$5.00	\$5.00	\$5.00	\$5.00
Manufacturing ternes ...	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars.....	2.15	2.15	2.15	2.15
Cold finished bars.....	2.65	2.65	2.65	2.65
Alloy bars.....	2.70	2.70	2.70	2.70
Structural shapes.....	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wire and Wire Products: (Cents Per Lb.)				
Plain wire.....	2.60	2.60	2.60	2.60
Wire nails.....	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails.....	\$40.00	\$40.00	\$40.00	\$40.00
Light rails.....	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets.....	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars.....	34.00	34.00	34.00	34.00
Slabs.....	34.00	34.00	34.00	34.00
Forging billets.....	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods.....	2.00	2.00	2.00	2.00
Skelp (grvd).....	1.90	1.90	1.90	1.90

Pig Iron:

(Per Gross Ton)

	Sept. 2, 1941	Aug. 26, 1941	Aug. 5, 1941	Sept. 3, 1940
No. 2 fdy., Philadelphia.	\$25.84	\$25.84	\$25.84	\$24.84
No. 2, Valley furnace....	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti....	24.06	24.06	24.06	23.06
No. 2, Birmingham.....	20.38	20.38	20.38	19.38
No. 2, foundry, Chicago†.	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa...	25.34	25.34	25.34	24.34
Basic, Valley furnace..	23.50	23.50	23.50	22.50
Malleable, Chicago†....	24.00	24.00	24.00	23.00
Malleable, Valley.....	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago..	31.34	31.34	31.34	30.34
Ferromanganese†.....	120.00	120.00	120.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. †For carlots at seaboard.

Scrap:

(Per Gross Ton)

Heavy melt'g steel, P'gh.	\$20.00	\$20.00	\$20.00	\$19.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	20.25
Heavy melt'g steel, Ch'go.	18.75	18.75	18.75	18.625
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.00
Low phos. plate, Youngs'n	23.00	23.00	23.00	23.00
No. 1 cast, Pittsburgh...	22.00	22.00	22.00	19.75
No. 1 cast, Philadelphia..	24.00	24.00	24.00	22.25
No. 1 cast, Ch'go*.....	21.00	21.00	21.00	17.25

*Changed to gross ton basis, April 3, 1941.

Coke, Connellsville:

(Per Net Ton at Oven)

Furnace coke, prompt....	\$6.125	\$6.125	\$6.125	\$4.75
Foundry coke, prompt...	6.875	6.875	6.875	5.25

Non-Ferrous Metals:

(Cents per Lb. to Large Buyers)

Copper, electro., Conn.*..	12.00	12.00	12.00	11.00
Copper, Lake, New York.	12.00	12.00	12.00	11.00
Tin (Straits), New York.	52.00	52.00	51.75	50.50
Zinc, East St. Louis.....	7.25	7.25	7.25	6.50
Lead, St. Louis.....	5.70	5.70	5.70	4.75
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 128-132 herein. On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in the detailed price tables.

... Composite Prices

FINISHED STEEL

Sept. 2, 1941.....	2.30467c. a Lb.....	\$23.61
One week ago.....	2.30467c. a Lb.....	\$23.61
One month ago.....	2.30467c. a Lb.....	\$23.61
One year ago.....	2.30467c. a Lb.....	\$22.61

PIG IRON

.....	a Gross Ton.....	\$23.61
.....	a Gross Ton.....	\$23.61
.....	a Gross Ton.....	\$23.61
.....	a Gross Ton.....	\$22.61

SCRAP STEEL

.....	a Gross Ton.....	\$19.17
.....	a Gross Ton.....	\$19.17
.....	a Gross Ton.....	\$19.17
.....	a Gross Ton.....	\$19.29

	High	Low
1941.....	2.30467c.,	2.30467c.,
1940.....	2.30467c., Jan. 2	2.24107c., Apr. 16
1939.....	2.35367c., Jan. 3	2.26689c., May 16
1938.....	2.58414c., Jan. 4	2.27207c., Oct. 18
1937.....	2.58414c., Mar. 9	2.32263c., Jan. 4
1936.....	2.32263c., Dec. 28	2.05200c., Mar. 10
1935.....	2.07642c., Oct. 1	2.06492c., Jan. 8
1934.....	2.15367c., Apr. 24	1.95757c., Jan. 2
1933.....	1.95578c., Oct. 3	1.75836c., May 2
1932.....	1.89196c., July 5	1.83901c., Mar. 1
1931.....	1.99629c., Jan. 13	1.86586c., Dec. 29
1930.....	2.25488c., Jan. 7	1.97319c., Dec. 9
1929.....	2.31773c., May 28	2.26498c., Oct. 29

A weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip. These products represent 78 per cent of the United States output. This revised index recapitulated to 1929 in the Aug. 28, 1941, issue.

	High	Low
\$23.61, Mar. 20	\$23.45, Jan. 2	
23.45, Dec. 23	22.61, Jan. 2	
22.61, Sept. 19	20.61, Sept. 12	
23.25, June 21	19.61, July 6	
23.25, Mar. 9	20.25, Feb. 16	
19.74, Nov. 24	18.73, Aug. 11	
18.84, Nov. 5	17.83, May 14	
17.90, May 1	16.90, Jan. 27	
16.90, Dec. 5	13.56, Jan. 3	
14.81, Jan. 5	13.56, Dec. 6	
15.90, Jan. 6	14.79, Dec. 15	
18.21, Jan. 7	15.90, Dec. 16	
18.71, May 14	18.21, Dec. 17	

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

	High	Low
\$22.00, Jan. 7	\$19.17, Apr. 10	
21.83, Dec. 30	16.04, Apr. 9	
22.50, Oct. 3	14.08, May 16	
15.00, Nov. 22	11.00, June 7	
21.92, Mar. 30	12.92, Nov. 10	
17.75, Dec. 21	12.67, June 9	
13.42, Dec. 10	10.33, Apr. 29	
13.00, Mar. 13	9.50, Sept. 25	
12.25, Aug. 8	6.75, Jan. 3	
8.50, Jan. 12	6.43, July 5	
11.33, Jan. 6	8.50, Dec. 29	
15.00, Feb. 18	11.25, Dec. 9	
17.58, Jan. 29	14.08, Dec. 3	

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel...

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point ↓ Product													DELIVERED TO		
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Phila- delphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes ²	3.80¢		3.80¢									4.55¢			
STRIP															
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled ⁴	2.80¢	2.90¢		2.80¢			2.80¢		(Worcester = 3.00¢)				2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢			2.95¢			2.95¢		(Worcester = 3.35¢)				3.05¢	3.31¢	
TIN PLATE															
Standard cokes, base box	\$5.00	\$5.00	\$5.00						\$5.10						\$5.32
BLACK PLATE															
29 gage ⁵	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (¹⁰)			3.37¢
TERNES, M'FG.															
Special coated, base box	\$4.30	\$4.30	\$4.30						\$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			(Duluth = 2.25¢)		2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					3.01¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢			(Bethlehem, Massillon, Canton = 2.70¢)				2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
									(Coatesville and Claymont = 2.10¢)						
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢ ⁽¹¹⁾		2.45¢	2.65¢	2.25¢	2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢							(Coatesville = 3.50¢)		3.95¢	4.15¢		3.70¢	3.37¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			(Bethlehem = 2.10¢)		2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢					(Worcester = 3.00¢)						
0.51 to 0.75 Carbon	4.30¢			4.30¢					(Worcester = 4.50¢)						
0.76 to 1.00 Carbon	6.15¢			6.15¢					(Worcester = 6.35¢)						
1.01 to 1.25 Carbon	8.35¢			8.35¢					(Worcester = 8.55¢)						
WIRE⁹															
Bright	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester = 2.70¢)			3.10¢			2.92¢
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester = 2.70¢)			3.10¢			2.92¢
Spring	3.20¢	3.20¢		3.20¢					(Worcester = 3.30¢)			3.80¢			3.52¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢
IRON BARS															
Common		2.25¢							(Terre Haute, Ind. = 2.15¢)						
Wrought single refined	4.40¢														
Wrought double refined	5.40¢														

¹ Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. ² Unassorted 8-lb. coating. ³ Widths up to 12 in. ⁴ Carbon 0.25 per cent and less. ⁵ Applies to certain width and length limitations. ⁶ For merchant trade. ⁷ Straight lengths as quoted by distributors. ⁸ Also shafting. For quantities of 20,000 to 39,999 lb. ⁹ Carload lot to manufacturing trade. ¹⁰ Boxed. ¹¹ Ship plates only.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2 higher; f.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton

Rerolling\$34.00
Forging quality 40.00

Shell Steel

Basic open hearth shell steel, f.o.b. Pittsburgh and Chicago.

Per Gross Ton

3 in. to 12 in.....\$52.00
12 in. to 18 in..... 54.00
18 in. and over..... 56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open hearth or bessemer.....\$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.) Per Lb.

Pittsburgh, Chicago, Cleveland 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.50c.
Galveston 2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

Alloy Steel Blooms, Billets and Slabs

Per Gross Ton

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem\$54.00

TOOL STEEL

(F.o.b. Pittsburgh)

Base per Lb.

High speed 67c.
High-carbon-chromium 43c.
Oil hardening 24c.
Special carbon 22c.
Extra carbon 18c.
Regular carbon 14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

PIG IRON

All prices set in bold face type are maxima established by OPACS on June 24, 1941. Other domestic prices are delivered quotations per gross ton computed on the basis of the official maxima.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorous	Charcoal
Boston.....	\$25.50	\$25.00	\$26.50	\$26.00	.....	.....
Brooklyn.....	27.50	.....	.....	28.00	.....	.....
Jersey City.....	26.53	26.03	27.53	27.03	.....	.....
Philadelphia.....	25.84	25.34	26.84	26.34	.....	.....
Bethlehem, Pa.....	\$25.00	\$24.50	\$26.00	\$25.50	.....	.....
Everett, Mass.....	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.....	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.....	.....	24.50	.....	.....	\$29.50	.....
Birdsboro, Pa.....	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.....	25.00	24.50	.....	.....	.....	.....
Erie, Pa.....	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.....	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa.*.....	24.00	23.50	24.50	24.00	.....	.....
Buffalo.....	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati.....	24.44	24.61	.....	25.11	.....	.....
Canton, Ohio.....	25.39	24.89	25.89	25.39	.....	.....
Mansfield, Ohio.....	25.94	25.44	26.44	25.94	.....	.....
St. Louis.....	24.50	24.02	.....	.....	.....	.....
Chicago.....	24.00	23.50	24.50	24.00	.....	\$31.34
Granite City, Ill.....	24.00	23.50	24.50	24.00	.....	.....
Cleveland.....	24.00	23.50	24.50	24.00	.....	.....
Hamilton, Ohio.....	24.00	23.50	.....	24.00	.....	.....
Toledo.....	24.00	23.50	24.50	24.00	.....	.....
Youngstown*.....	24.00	23.50	24.50	24.00	.....	.....
Detroit.....	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.....	.....	.....	.....	.....	.....	\$28.00
Lyles, Tenn. fc.†.....	.....	.....	.....	.....	.....	33.00
St. Paul.....	26.63	.....	27.13	26.63	.....	.....
Duluth.....	24.50	.....	25.00	24.50	.....	.....
Birmingham.....	20.38	19.00	25.00	.....	.....	.....
Los Angeles.....	27.50	.....	.....	.....	.....	.....
San Francisco.....	27.50	.....	.....	.....	.....	.....
Seattle.....	27.50	.....	.....	.....	.....	.....
Provo, Utah.....	22.00	.....	.....	.....	.....	.....
Montreal.....	27.50	27.50	.....	28.00	.....	.....
Toronto.....	25.50	25.50	.....	26.00	.....	.....

GRAY FORGE IRON

Valley or Pittsburgh furnace..... \$23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade (1.75 per cent to 2.25 per cent).

Phosphorous Differential: Basing point prices are subject to a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over.

†Price shown is for low-phosphorous iron; high-phosphorous sells for \$28.50 at the furnace.

Manganese Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

WAREHOUSE PRICES

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled.....	\$3.35	\$3.05	\$3.35	\$3.75	\$3.58	\$3.43	\$3.25	\$3.71	\$3.45	\$3.39	\$3.30	\$3.38	\$5.10
Sheets, cold rolled.....	.....	4.10	4.05	4.05	4.60	4.30	4.30	3.68	.....	4.24	4.35	4.23	7.30
Sheets, galvanized.....	4.65	4.60	4.75	5.00	5.00	4.84	4.75	5.11	4.75	4.99	4.75	4.98	6.30
Strip, hot rolled.....	3.60	3.40	3.50	3.95	3.96	3.68*	3.82	4.06	3.70	3.74	3.65	3.73	.....
Strip, cold rolled.....	3.20	3.30	3.20	3.31	3.51	3.40	3.52	3.46	.....	3.61	3.83	3.54	.....
Plates.....	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.95
Structural shapes.....	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.95
Bars, hot rolled.....	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	**4.15
Bars, cold finished.....	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300.....	7.45	7.10	7.55	7.31	7.60	7.67	7.35	7.50	.....	7.72	7.45	7.58	10.35
Bars, ht. rld. SAE 3100.....	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	.....	6.02	6.00	5.88	9.35
Bars, ed. drn. SAE 2300.....	8.40	8.15	8.40	8.56	8.84	8.70	8.40	8.63	.....	8.77	8.84	8.63	11.35
Bars, ed. drn. SAE 3100.....	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	.....	7.12	7.44	6.98	10.35

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strips, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb., cold rolled strip 0.095 in. and lighter; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga.—1 to 1499 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, \$3.43. **Over 4 in. wide and over 1 in. thick, \$4.95.

CORROSION AND HEAT-
RESISTING STEELS

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F. Billets	15.73c.	16.15c.	19.13c.	23.38c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	25.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
*Motor	4.95c.
*Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 75c. per 100 lb.

*In some instances motor grade is referred to as dynamo grade and dynamo grade is referred to as dynamo special.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, per
Package of 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C. ...	\$6.00	\$12.00
15-lb. coating I.C. ...	7.00	14.00
20-lb. coating I.C. ...	7.50	15.00
25-lb. coating I.C. ...	8.00	16.00
30-lb. coating I.C. ...	8.63	17.25
40-lb. coating I.C. ...	9.75	19.50

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and Carriage Bolts:	
6 1/2 in., shorter and smaller ..	65 1/2
6 x 5/8 in., and shorter ..	63 1/2
6 in. by 3/4 to 1 in. and shorter ..	61
1 1/8 in. and larger, all length ..	59
All diameters over 6 in. long ..	59
Lag, all sizes ..	62
Plow bolts ..	65

Nuts, Cold Punched or Hot Pressed:
(hexagon or square)

1/2 in. and smaller	62
9/16 to 1 in. inclusive	59
1 1/8 to 1 1/2 in. inclusive	57
1 5/8 in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller ..	64	..
1/2 in. and smaller	62	..
1/2 in. through 1 in.	60	..
9/16 to 1 in.	59	..
1 1/8 in. through 1 1/2 in. ..	57	58
1 5/8 in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	71 and 10
Stove bolts in packages, with nuts attached	71
Stove bolts in bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York lots of 200 lb. or over.

Large Rivets

(1/2 in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	\$3.75
---	--------

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5
---	----------

Cap and Set Screws

Per Cent Off List

Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller	60
Upset set screws, cup and oval points	68
Milled studs	40
Flat head cap screws, listed sizes ..	30
Filister head cap, listed sizes ..	46

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

WIRE PRODUCTS

(To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

Base per Keg

Standard wire nails	\$2.55
Coated nails	2.55
Cut nails, carloads	3.85

Base per 100 Lb.

Annealed fence wire	\$3.05
---------------------------	--------

Base Column

Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbed wire	70

*15 1/2 gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes.

Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless	Lap Weld, Cold	Hot Rolled	Hot Rolled
2 in. o.d. 13 B.W.G. 15.03 13.04 12.38				
2 1/2 in. o.d. 12 B.W.G. 20.21 17.54 16.58				
3 in. o.d. 12 B.W.G. 22.48 19.50 18.35				
3 1/2 in. o.d. 11 B.W.G. 28.37 24.62 23.15				
4 in. o.d. 10 B.W.G. 35.20 30.54 28.66				

(Extras for less carload quantities)

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft. ..	5%
20,000 lb. or ft. to 29,999 lb. or ft. ..	10%
10,000 lb. or ft. to 19,999 lb. or ft. ..	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON
PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
(F.o.b. Pittsburgh only on wrought pipe)

Base Price = \$200 Per Net Ton

Steel (Butt Weld)

	Black	Galv.
1/2 in.	63 1/2	51
3/4 in.	66 1/2	55
1 to 3 in.	68 1/2	57 1/2

Wrought Iron (Butt Weld)

1/2 in.	24	3 1/2
3/4 in.	30	10
1 and 1 1/4 in.	34	16
1 1/2 in.	38	18 1/2
2 in.	37 1/2	18

Steel (Lap Weld)

2 in.	61	49 1/2
2 1/2 and 3 in.	64	52 1/2
3 1/2 to 6 in.	66	54 1/2

Wrought Iron (Lap Weld)

2 in.	30 1/2	12
2 1/2 to 3 1/2 in.	31 1/2	14 1/2
4 in.	33 1/2	18
4 1/2 to 8 in.	32 1/2	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
1/2 in.	61 1/2	50 1/2
3/4 in.	65 1/2	54 1/2
1 to 3 in.	67	57

Wrought Iron (Same as Above)

1/2 in.	25	6
3/4 in.	31	12
1 to 2 in.	38	19 1/2

Steel (Lap, extra strong, plain ends)

2 in.	59	48 1/2
2 1/2 and 3 in.	63	52 1/2
3 1/2 to 6 in.	66 1/2	56

Wrought Iron (Same as above)

2 in.	33 1/2	15 1/2
2 1/2 to 4 in.	39	22 1/2
4 1/2 to 6 in.	37 1/2	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card. F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

CAST IRON WATER PIPE

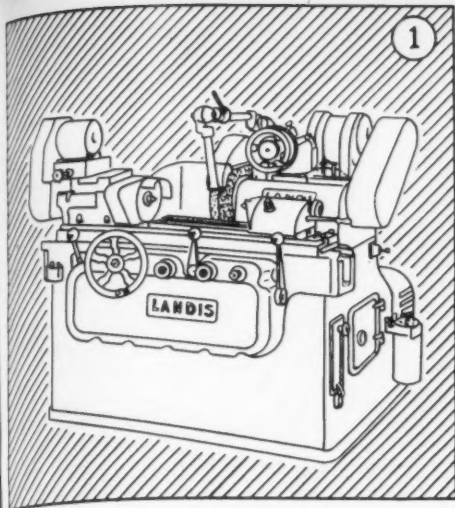
Per Net Ton

6-in. and larger, del'd Chicago ..	\$54.80
6-in. and larger, del'd New York ..	52.20
6-in. and larger, Birmingham ..	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago.

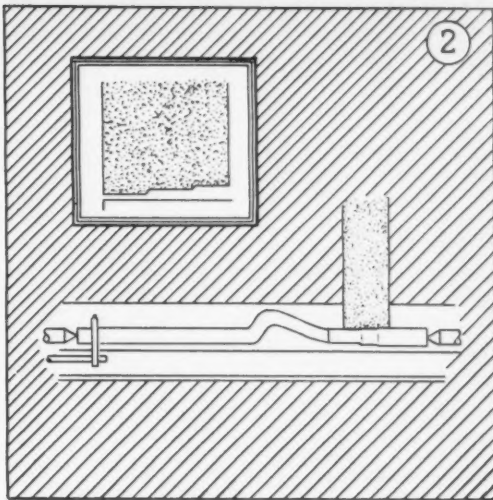
FUEL OIL

No. 3, f.o.b. Bayonne, N. J.	4.90c.
No. 6, f.o.b. Bayonne, N. J.	3.21c.
No. 6 Bur. Stds., del'd Chicago ..	2.75c.
No. 3 distillate del'd Cleveland ..	6.25c.
No. 4 indus., del'd Cleveland ..	5.75c.
No. 6 indus., del'd Cleveland ..	5.00c.



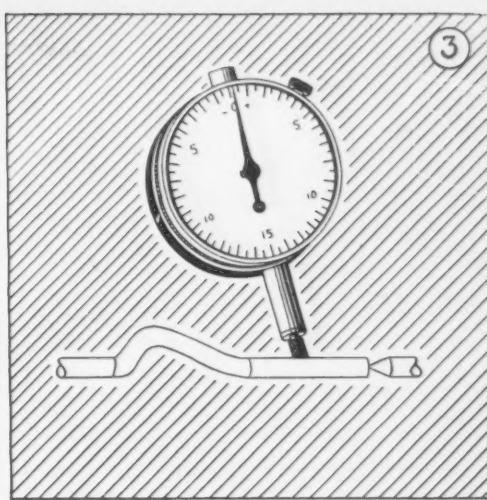
6" Type C Plain Grinder

This Landis 6" Type C Plain Hydraulic Grinder equipped with hydraulic straight infeed has been installed in the plant of a well-known manufacturer where it is being used to grind certain sewing machine parts, in this case a rotary arm shaft.



Grinding a Rotary Arm Shaft

In grinding this part the wheel is profiled as shown (exaggerated) in the insert above. The Landis hydraulic straight infeed and hydraulic table traverse combine to form a cycle rapid in production—close in accuracy. This cycle is discussed below.



Limits Are .0002"

In this operation close accuracy and fine finish are imperative; therefore this Landis machine must consistently grind within limits of .0002". From .006" to .008" stock is removed and the work is ground to size during one traverse round trip.

Landis HYDRAULIC STRAIGHT INFEEED scores again



Every time the Landis hydraulic straight infeed has gone to bat for a manufacturer it has scored a hit. Not really a new feature of Landis machines, modern grinding demands have pushed it farther and farther into the bright circle of successfully engineered equipment.

In some instances where extremely slow and uniform feed is required it is practically a necessity for the successful grinding of a job. In other instances it so speeds up production and increases efficiency that it becomes insurance for profitable grinding.

In the accompanying illustrations you see what does not appear to be a type of operation that would successfully utilize the Landis hydraulic straight infeed mechanism. Yet notice how this infeed peps up production when combined with hydraulic table traverse. First the wheel is profiled to three diameters. The wheel feeds straight in until all three diameters are removing stock and the largest is grinding to approximate size. The table is then traversed so that each diameter of the wheel removes its own small layer of stock. The largest wheel diameter, of course, still grinds approximately to size. At the end of this traverse the table is reversed and the largest diameter of the wheel on its return grinds within limits of .0002" to a fine finish. Only one traverse round trip is needed; then the wheel feeds rapidly back. The operation requires about 20 seconds—a production increase of 200% over former grinding equipment.

Is it any wonder then that so many men who know grinding are enthusiastic about the Landis hydraulic straight infeed? Give it a chance to go to bat and score a hit for you. At least write to us and find out more about it.

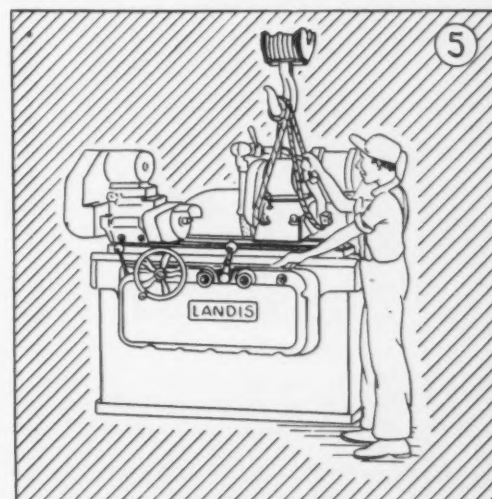


376



Production Increased 200%

The combination of Landis hydraulic straight infeed and hydraulic table traverse has enabled this machine to increase production 200% over former equipment. Each operation now requires only 20 seconds as compared to the 60 seconds required before.



Two Headstocks—More Jobs

And as though this fine performance were not enough, the machine is equipped with a special live spindle headstock which can be placed on the machine without disturbing the standard headstock. With this, two other sewing machine parts (including several eccentrics) can be ground.

LANDIS TOOL CO.
WAYNESBORO • PENNSYLVANIA

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia,
Baltimore, Mobile or New
Orleans, Domestic, 80%,
per gross ton (carloads)...\$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....\$36.00
Domestic, 26 to 28%..... 49.50

Electric Ferrosilicon

(Per Gross Ton, Delivered Lump Size)

50% (carload lots, bulk).....\$74.50*
50% (ton lots, packed)..... 87.00*
75% (carload, lots, bulk).....135.00*
75% (ton lots, packed).....151.00*

Silvery Iron

(Per Gross Tons, base 6.00 to 6.50 Si)

F.O.B. Jackson, Ohio\$29.50*
Buffalo\$30.75*

For each additional 0.25% silicon up to
and including 11.50%, add 50c. a ton. For
each 0.50% manganese over 1% add 50c.
a ton. Add \$1 a ton for 0.75% phosphor-
ous or over.

* Official OPACS price established June
25.

Bessemer Ferrosilicon

Prices are \$1 a ton above Silvery Iron
quotations of comparable analysis.

Ferrochrome(Per Lb. Contained Cr, Delivered Carlots,
Lump Size, on Contract)

4 to 6 carbon11.00c.
2 carbon17.50c.
1 carbon18.50c.
0.10 carbon20.50c.
0.06 carbon21.00c.

Spot prices are ¼c. per lb. of contained
chromium higher.

Silico-Manganese(Per Gross Ton, Delivered, Lump Size,
Bulk, on Contract)

3 carbon\$113.00*
2.50 carbon 118.00*
2 carbon 123.00*
1 carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. con-
tained W, del'd carload.... \$2.00

Ferrotungsten, 100 lb. and less \$2.25

Ferrovanadium, contract, per
lb. contained V, del'd \$2.70 to \$2.90†

Ferrocolumbium, per lb. con-
tained Cb, f.o.b. Niagara
Falls, N. Y., ton lots..... \$2.25†

Ferrocobaltititanium, 15-18 Ti,
7-8 C, f.o.b. furnace, carload,
contract, net ton.....\$142.50

Ferrocobaltititanium, 17-20 Ti,
3-5 C, f.o.b. furnace, carload,
contract, net ton.....\$157.50

Ferrophosphorus, electric or
blast furnace material, car-
loads, f.o.b. Anniston, Ala.,
for 18%, with \$3 unitage
freight, equalized with Rock-
dale, Tenn., gross ton..... \$58.50

Ferrophosphorus, electrolytic
23-26%, carlots, f.o.b. Mon-
sato (Siglo), Tenn., \$3 unit-
age, freight equalized with
Nashville, gross ton..... \$75.00

Ferromolybdenum, per lb. Mo,
f.o.b. furnace 95c.

Calcium molybdate, per lb.
Mo, f.o.b. furnace..... 80c.

Molybdenum oxide briquettes
48-52 Mo, per lb. contained
Mo, f.o.b. Langeloth, Pa.... 80c.

Molybdenum oxide, in cans, per
lb. contained Mo, f.o.b. Wash-
ington, Pa. 80c.

*Spot prices are \$5 per ton higher.
†Spot prices are 10c. per lb. of con-
tained element higher.

ORES

Lake Superior Ores (51.50% Fe.)

(Delivered Lower Lake Ports)

Per Gross Ton

Old range, bessemer, 51.50.... \$4.75
Old range, non-bessemer, 51.50 4.60
Mesaba, bessemer, 51.50..... 4.60
Mesaba, non-bessemer, 51.50... 4.45
High phosphorus, 51.50..... 4.35

Foreign Ores*(C.i.f. Philadelphia or Baltimore,
Exclusive of Duty)

Per Unit

African, Indian, 44-48 Mn.. 65c. to 66c.
African, Indian, 49-51 Mn.. 67c. to 69c.

Brazilian, 46-48 Mn.....65c.
Cuban, del'd, 51 Mn.....79c. to 81c.

Per Short Ton Unit

Tungsten, Chinese Wolframite,
duty paid, delivered....\$24 to \$26

Tungsten, domestic scheelite, at
mine\$24.00

Chrome ore, lump, c.i.f. Atlantic
Seaboard, per gross ton; South
African (low grade).....Nom.

Rhodesian, 45\$32.00

Rhodesian, 48\$39.00-\$40.00

*Importations no longer readily avail-
able. Prices shown are nominal.

COKE

Furnace

Per Net Ton

Connellsville, prompt ...\$6.00 to \$6.25

Foundry

Connellsville, prompt ...\$6.75 to \$7.00

By-product, Chicago\$10.50

By-product, New England....\$13.75

By-product, Newark..\$12.40 to \$12.95

By-product, Philadelphia\$12.13

By-product, Cleveland\$12.30

By-product, Cincinnati\$11.75

By-product, Birmingham \$8.50

By-product, St. Louis.\$10.75 to \$11.00

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60
lb., gross ton\$40.00
Angle bars, 100 lb. 2.70

(F.o.b. Basing Points)

Per Gross Ton

Light rails (from billets).....\$40.00
Light rails (from rail steel)... 39.00

Base per Lb.

Cut spikes 3.00c.

Screw spikes 5.15c.

Tie plates, steel 2.15c.

Tie plates, Pacific Coast 2.30c.

Track bolts, heat treated, to
railroads 5.00c.

Track bolts, jobbers discount.. 63-5

Basing points, light rails—Pittsburgh,
Chicago, Birmingham; spikes and tie
plates—Pittsburgh, Chicago, Portsmouth,
Ohio, Weirton, W. Va., St. Louis, Kansas
City, Minneapqua, Colo., Birmingham and
Pacific Coast ports; tie plates alone—
Steelton, Pa., Buffalo; spikes alone—
Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5
f.o.b. Kentucky and Illinois
mines, all rail....\$22.00 to \$23.00

Domestic, f.o.b. Ohio River land-
ing barges 22.00 to 23.00

No. 2 lump, 85-5 f.o.b. Kentucky
and Illinois mines..22.00 to 23.00

Foreign, 85% calcium fluoride,
not over 5% Si, c.i.f. Atlantic
ports, duty paid.....Nominal

Domestic No. 1 ground bulk, 96
to 98%, calcium fluoride, not
over 2½% silicon, f.o.b. Illi-
nois and Kentucky mines.... 31.00

As above, in bags, f.o.b. same
mines 32.60

REFRACTORIES

(F.o.b. Works)

Per 1000

Super-duty brick, St. Louis...\$64.60

First quality, Pennsylvania,
Maryland, Kentucky, Missouri
and Illinois 51.30

First quality, New Jersey..... 56.00

Second quality, Pennsylvania,
Maryland, Kentucky, Missouri,
and Illinois 46.55

Second quality, New Jersey ... 51.00

No. 1, Ohio 43.00

Ground fire clay, net ton..... 7.60

Silica Brick

Per 1000

Pennsylvania\$51.30

Chicago District 58.90

Birmingham 51.30

Silica cement, net ton (Eastern) 9.00

Chrome Brick

Per Net Ton

Standard, f.o.b. Baltimore, Plym-
outh Meeting and Chester...\$54.00

Chemically bonded, f.o.b. Balti-
more, Plymouth Meeting and
Chester, Pa. 54.00

Magnesite Brick

Standard f.o.b. Baltimore and
Chester\$76.00

Chemically bonded, f.o.b. Balti-
more 65.00

Grain Magnesite

Domestic, f.o.b. Baltimore and
Chester\$44.00

Domestic, f.o.b. Chewelah, Wash.
(in bulk) 22.00

INDEPENDENT CONTROL FOR *All* SIDE SLIDES

Two each of slides 1-2-3 are available on 6 and 8 Spindle Acme-Gridley Bar Automatics.

1. Lower side slides independent from each other are heavy and wide, firmly supported low in the frame.
2. Intermediate side slides are independently controlled by vertically mounted cam drums located on upright shafts and driven from the lower side slide drum.
3. Upper side slides are independently controlled from two longitudinal drums in the sturdy top brace and driven through gears and shaft from the lower cross slide drum.

What does this kind of design and construction mean for today—and tomorrow?

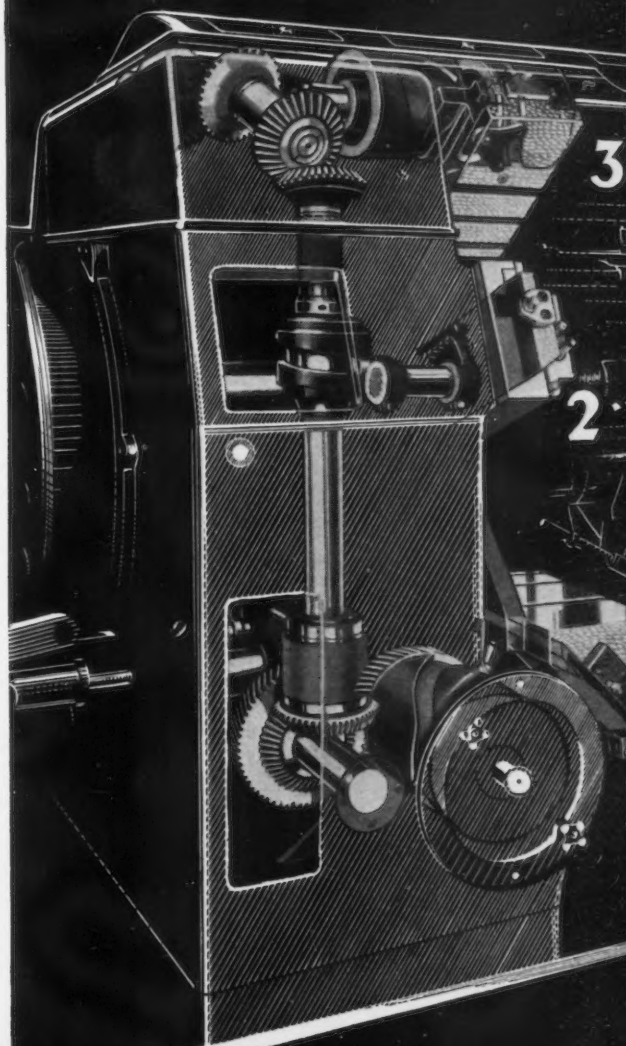
It means close and positive operating linkage—accurate tooling performance.

It means quick adaptability of standard tools—versatility for the widest variety of defense jobs.

When times grow tough and orders scarce, these and other inherent Acme-Gridley factors for speed, precision and versatility, result in a minimum of machine investment with consequent greater profit.

Investigate these profit factors today—for tomorrow.

Acme-Gridley



REMEMBER THIS—
sustained accuracy at the fastest feeds and highest spindle speeds that modern cutting tools can safely stand.

NATIONAL ACME

170 EAST 131ST STREET • CLEVELAND, O.

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

SALES POSSIBILITIES

... CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

• **General Electric Co.**, Lynn, Mass., has let general contract to Turner Construction Co., 420 Lexington Avenue, New York, for one-story addition, about 250,000 sq. ft. of floor space, to be known as gear shop No. 2, for production of reduction gears for government. Cost over \$2,000,000 with equipment.

• **Cuno Engineering Corp.**, 80 South Vine Street, Meriden, Conn., electric automotive equipment, filters, strainers, etc., will begin superstructure for two-story and basement addition, 45 x 100 ft., for which general contract recently was let to H. Wales Lines Co., 134 State Street. Cost over \$65,000 with equipment.

• **South Portland Ship Building Corp.**, South Portland, Me., will expend about \$2,000,000 for expansion, including two shipways, outfitting docks and other structures, several of which are being placed under way, as recently noted in these columns. Fund in amount mentioned has been secured through U. S. Maritime Commission, Washington, for which several vessels will be constructed.

• **Draper Corp.**, Hopedale, Mass., textile mill machinery and parts, has let general contract to Bathelt Construction Co., 380 High Street, Holyoke, Mass., for four-story addition, 140 x 300 ft. Cost close to \$400,000 with equipment. McClintock & Craig, Inc., 458 Bridge Street, Springfield, Mass., is architect and engineer.

• **Armour & Co., Inc.**, Union Stock Yards, Chicago, and 330 Canal Street, Providence, R. I., has let general contract to Hope Building Co., Inc., 36 Exchange Place, Providence, for new one-story and basement meat-processing and packing plant, about 125 x 240 ft., at 100 Harris Avenue, Providence. Cost about \$200,000 with equipment. Jenks & Ballou, Industrial Trust Building, Providence, are supervising architects and engineers.

• **Bullard Co.**, Bridgeport, Conn., machine tools and parts, has let general contract to Turner Construction Co., 420 Lexington Avenue, New York, for one-story addition, 60 x 156 ft., for storage and distribution. Cost close to \$65,000 with equipment.

• **Harrington-Rex Co.**, 411 Thirteenth Street, Brooklyn, precision machinery and parts, has acquired property at Garwood, N. J., for new one-story plant, 80 x 132 ft., for production of gun sights for government. Present works will be removed to new location and capacity increased. Cost over \$60,000 with equipment.

• **Park & Tilford Distillers, Inc.**, 548 West Forty-fourth Street, New York, will take bids soon on general contract for eight-story storage and distributing building, 115 x 283 ft., at plant at Thirty-fifth and Tyler Streets, Louisville. Cost close to \$200,000 with equipment. Thomas J. Nolan, Kentucky Home Life Building, Louisville, is architect. Company has acquired plants and properties of Krogman Distilling Co., Inc., Tell City, Ind., and Woodford County Distilling Co., Midway, Ky. Improvements will be made and operations begun at both distilleries soon.

• **Burchell Products, Inc.**, 72 Spring Street, New York, precision instruments and parts, has leased a floor in building at 226-42 William Street, about 25,000 sq. ft. floor space, for expansion.

• **General Electric Co.**, River Road, Schenectady, N. Y., plans one-story addition, about 120,000 sq. ft. of floor space, for production of radio tubes and kindred products. Cost close to \$700,000 with equipment. Company also has approved plans for one and multi-story addition, for assembling and testing radio equipment for government, and has purchased former local plant of Weber Electric Co., which will be modernized as part of latter project. New plant is scheduled for completion next spring and will cost about \$2,400,000, of which over \$1,000,000 will be expended for equipment. Defense Plant Corp., Washington, will furnish appropriation in amount noted.

• **American Smelting & Refining Co.**, 120 Broadway, New York, will build a by-products plant for production of sulphuric acid, in connection with new electrolytic zinc refinery at Corpus Christi, Tex., previously noted in these columns, on which work is being placed under way. Entire project will cost about \$5,000,000 with equipment.

• **Standard Milling Co.**, 503 Seneca Street, Buffalo, has filed plans for multi-story addition to flour mill and elevator at 1 St. Clair Avenue. Cost close to \$300,000 with equipment. Work is under way.

• **Harrison Radiator Division**, General Motors Corp., Lockport, N. Y., will use new addition, previously noted, for a refrigerated wind tunnel unit for testing radiators under freezing conditions, with section of structure for similar testing of oil coolers and other aircraft parts under zero and sub-zero temperatures. Cost about \$100,000 with machinery.

• **National Carbon Co., Inc.**, 3625 Highland Avenue, Niagara Falls, N. Y., plans four one and multi-story additions. Cost close to \$650,000 with equipment. General offices are at 30 East Forty-second Street, New York.

• **Board of Education**, City Hall, Buffalo, James Storer, secretary, asks bids until Sept. 9 for machine tool equipment, and for aeronautical and metal-working equipment for industrial and technical vocational high school.

• **Diehl Mfg. Co.**, Trumbull and First Streets, Elizabeth, N. J., electric motors, generators, fans, etc., has let contract to Austin Co., Cleveland, for new plant on 300-acre tract at Finnerne, Bridgewater Township, N. J., totaling about 240,000 sq. ft. of floor space. Cost close to \$1,000,000 with equipment. Company is a subsidiary of Singer Mfg. Co., 149 Broadway, New York.

• **Calco Chemical Co., Inc.**, Bound Brook, N. J., has let general contract to E. DeCristofer, 214 West High Street, for addition to power house, about 100 x 130 ft. Cost over \$100,000 with equipment.

• **Commanding Officer**, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Sept. 8 for twist drills (Circular 335), pressure gage spring valves (Circular 345), steel conduit (Circular 338); until Sept. 9, ball bearings (Circular 358), steel hobs (Circular 366), twist drills, countersink drills (Circular 360), booster casing assemblies (Circular 328), brass valves (Circular 359), air hose (Circular 372); until Sept. 10, brass couplings, bushings, etc. (Circular 374).

• **Henry L. Crowley & Co., Inc.**, 1 Central Avenue, West Orange, N. J., special resistance and insulation products, has let general contract to G. Willard Wharton, 39 Nishuane Road, Montclair, N. J., for one-story addition, 50 x 300 ft., for production of radio parts for government. Fund of \$245,000 has been secured through Defense Plant Corp., Washington, for project.

• **Philadelphia Coca-Cola Bottling Co., Inc.**, Thirty-third and Reed Streets, Philadelphia, has engaged Frank E. Hahn, 1700 Walnut Street, architect, to prepare plans for one and multi-story mechanical-bottling, storage and distributing plant on Hunting Park Avenue, near Thirty-fourth Street. Cost over \$500,000 with equipment.

• **War Department**, Washington, has taken title to former plant of Atwater Kent Mfg. Co., Philadelphia, and 24-acre tract adjoining, for consideration of \$2,000,000, for Eastern seaboard depot of Signal Corps, now located at Army Base, Brooklyn. Property will be vacated this month when improvements will be made for new works.

• **American Bantam Car Co.**, Butler, Pa., plans one-story addition, 50 x 250 ft., for parts and assembling divisions. Cost close to \$100,000 with equipment.

• **Socony-Vacuum Oil Co., Inc.**, Robb Street, Pittsburgh, has purchased about five acres at Midland, Pa., fronting on Ohio River, for new marine terminal with steel tank storage farm, unloading docks, pumping station, pipe lines

and other facilities. Cost over \$150,000 with equipment.

• **Dresser Mfg. Co.**, Bradford, Pa., pipe couplings, pipe line equipment, etc., plans one-story addition, 80 x 100 ft. Cost over \$50,000 with equipment.

• **War Department**, Washington, will have plans drawn by Frederick Spare Corp., 114 Liberty Street, New York, engineer and contractor, for new storage and shipping terminal for lease-lend equipment and supplies at Caven Point, Jersey City, N. J., consisting of six berths, with docks, warehouses, shops and other structures. Fund of \$2,000,000 has been authorized for project.

• **Bureau of Supplies and Accounts**, Navy Department, Washington, asks bids until Sept. 9 for motor-driven woodworking machines (Schedule 8398), gasoline engine-driven truck-type cranes (Schedule 8440), steel forgings (Schedule 8491), motor-driven power hacksaws (Schedule 8466), electric cable (Schedule 8441), cast iron and pig lead weights (Schedule 8496); until Sept. 11 for portable spray pumps (Schedule 8464); until Sept. 12, lapping machines and lapping pistons (Schedule 8487), stockless steel anchors (Schedule 8439), motor-driven drilling machine (Schedule 8468), electric furnace (8467) for Eastern and Western Navy yards.

The South

• **Reynolds Corp.**, Southern Building, Washington, has let general contract to Mion Construction Co., Bona Allen Building, Atlanta, Ga., for one-story additions to fuse-manufacturing plant at Macon, Ga., now in course of completion, for production for government. New structures will cost \$483,000 exclusive of equipment.

• **Charleston Shipbuilding & Drydock Co.**, Concord Street, Charleston, S. C., will begin work soon on new outfitting dock. Cost over \$175,000 with equipment. This is part of expansion now being carried out at plant for construction of vessels for U. S. Maritime Commission, Washington.

• **American Lava Corp.**, Manufacturers' Road, Chattanooga, Tenn., special insulation products, has let general contract to Mark K. Wilson, Loveman Building, for four-story addition. Cost close to \$100,000 with equipment. W. H. Sears, James Building, is architect.

• **Virginia Public Service Co.**, Alexandria, Va., plans extensions at local steam-electric generating station, with installation of new 15,000-kw. turbine-generator unit, high-pressure boiler and auxiliary equipment. This is part of expansion and improvements to be carried out in 1942, to include extensions in transmission and distributing lines, power substations and other operating facilities, and for which a fund of about \$4,000,000 is being arranged. Similar appropriations are planned for two succeeding years, making total fund of \$12,000,000 in 36 months. Atlantic Utility Service Corp., 61 Broadway, New York, is engineer for power plant expansion.

• **United States Engineer Office**, Vicksburg, Miss., asks bids until Sept. 8 for one gasoline engine-operated electric generating set (Circular 30).

• **Delta Shipbuilding Co.**, New Orleans, plans expansion, including two new shipways, outfitting dock, construction and repair shops and other structures, for construction of vessels for U. S. Maritime Commission. Cost about \$2,000,000. Government will furnish fund in amount noted.

• **Texas Co.**, 720 San Jacinto Street, Houston, Tex., plans expansion at oil refinery at Port Arthur, Tex., with installation of new production unit for high-test gasoline for aviation service. Cost close to \$350,000 with equipment.

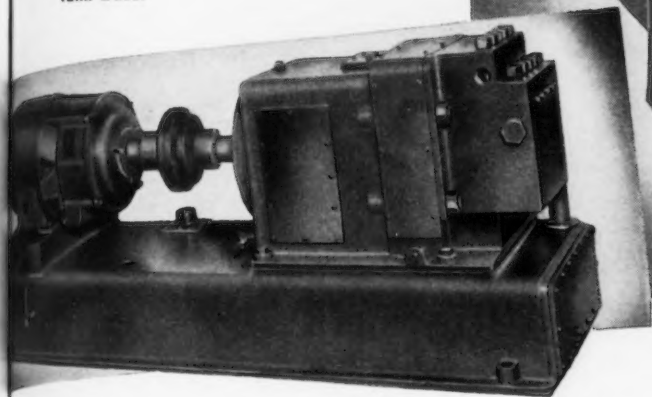
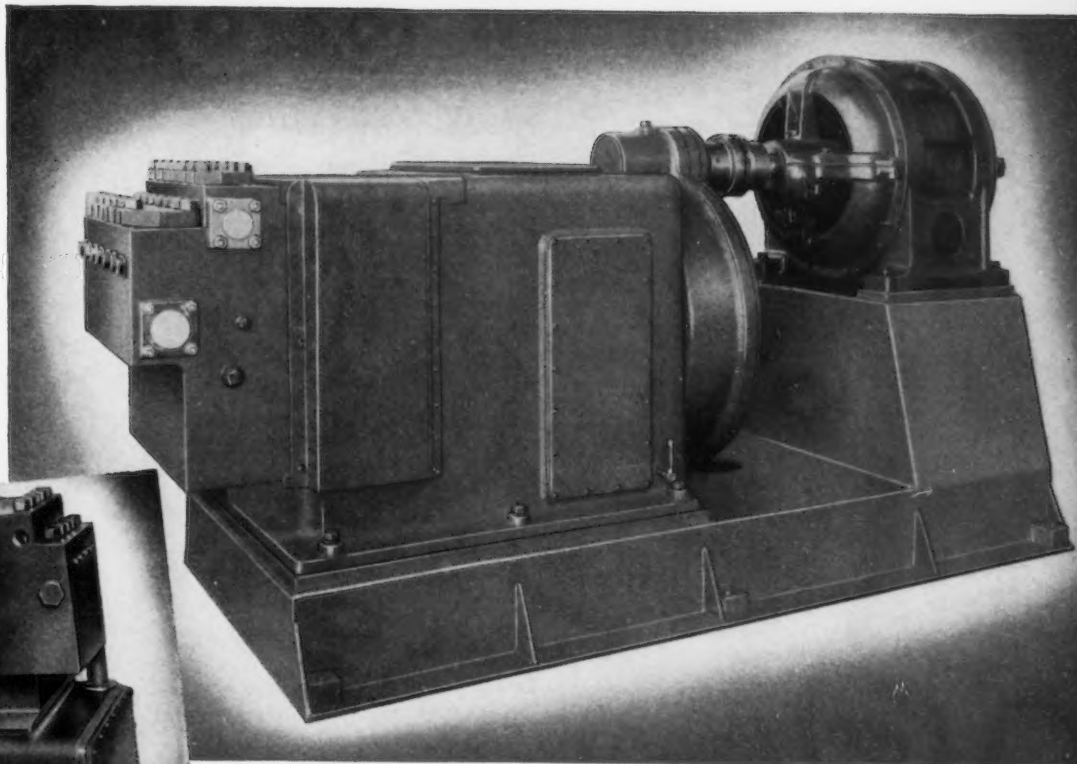
• **Texas Lawn Sprinkler & Supply Co.**, 415 Dawson Street, San Antonio, Tex., has approved plans for new three-story plant, 60 x

W-S Stediflo

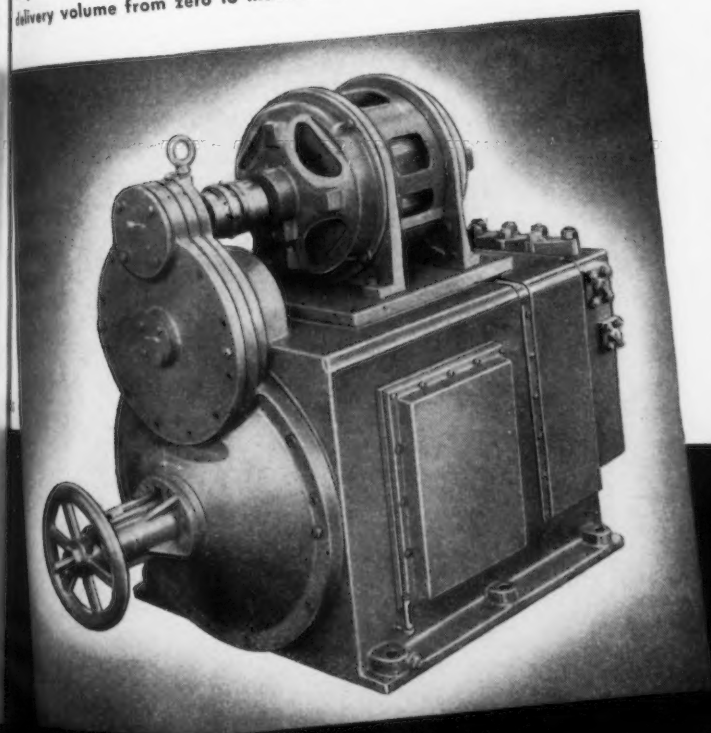
HYDRAULIC PRESSURE PUMPS

- 200 Horsepower STEDIFLO Pump with built-in reduction gearing.

- 7½ Horsepower STEDIFLO Pump directly connected to a gear head motor. Pump and motor mounted on a standard tank base.



New . . . An extended development of the standard line of STEDIFLO Pumps is this new variable delivery model. Plunger stroke may be varied by means of a hand wheel giving accurate control over delivery volume from zero to maximum.



STEDIFLO Hydraulic Pressure Pumps embody the most advanced design, skilled workmanship and highest quality materials—assuring trouble-free, non-stop operation at low cost under all conditions.

While primarily designed for hydraulic service, the use of a pump body entirely separate from the power unit permits the installation of special pump bodies to handle fluids of all kinds.

High mechanical efficiency is attained through the use of a "swash-plate" form of operating mechanism with conventional packed plungers and poppet valves. Fully enclosed operating parts with positive lubrication reduces maintenance to a minimum.

STEDIFLO pumps are available in standard sizes from 3 to 200 horsepower, for pressures of 1,500-10,000 lbs. per sq. in.

Write for bulletin C-37 giving complete information on these compact, quiet operating STEDIFLO Hydraulic Pressure Pumps.

THE WATSON-STILLMAN CO., ROSELLE, N. J.

WATSON - STILLMAN

SALES POSSIBILITIES

120 ft., to include a machine shop, tool shop, assembling works and other mechanical departments. Cost close to \$70,000 with equipment.

Cardox Co., 307 North Michigan Avenue, Chicago, mining equipment, blasting cartridges, etc., plans new branch plant at Claremore, Okla., where about 20 acres has been acquired, consisting of machine and other metal-working shops, storage and distribution buildings. Cost over \$200,000 with equipment.

Rath Packing Co., 2117 Walker Street, Houston, Tex., meat packer, has asked bids on general contract for one and multi-story addition for expansion in processing and packing departments. Cost close to \$100,000 with equipment.

Central States

• **Pipe Machinery Co.**, 930 Seventieth Street, Cleveland, has let general contract to Masters & Mullen Construction Co., Chester-Twelfth Street Building, for one-story addition, 82 x 110 ft., for production of machine tool equipment for government. This is part of expansion to be carried out and for which fund of \$200,000 has been secured through Defense Plant Corp., Washington.

Hertner Electric Co., 12690 Elmwood Avenue, Cleveland, motors, generating sets, parts, etc., has let general contract to E. J. Benes & Co., Terminal Tower Building, for one-story addition, 60 x 240 ft., with extension about 30 x 60 ft. Cost over \$100,000 with equipment.

United States Engineer Office, Post Office and Court House, Cincinnati, closes bids Sept. 10 for Mill Creek pumping station and appurtenant works, Contract No. 2, Cincinnati, including traveling crane, steel conduits and fittings, cast steel, piping, etc. (Circular 15).

Bishop & Babcock Mfg. Co., 4901 Hamilton Avenue, Cleveland, automobile parts, refrigerating and air-conditioning apparatus, etc., has contract from War Department, Washington, for production of shells, and will convert a five-story branch plant at East Fifty-fifth Street and line of New York Central Railroad for this purpose. Contract totals close to \$3,000,000, of which about \$900,000 will be used for equipment, plant improvements, etc.

LeGanke & Sons Stamping Co., 864 East 140th Street, Cleveland, sheet metal stampings, dies, etc., plans one-story addition, about 40 x 130 ft. Cost over \$50,000 with equipment.

Hobart Mfg. Co., Troy, Ohio, electric appliances, mixers, etc., for domestic service, has let general contract to Austin Co., Cleveland, for one-story addition. Cost over \$50,000 with equipment.

Colgate-Palmolive-Peet Co., Inc., Jeffersonville, Ind., soap products, etc., has let general contract to Turner Construction Co., 420 Lexington Avenue, New York, for two and four-story addition. Cost about \$500,000 with equipment. Main offices are at Jersey City, N. J.

McDonnell Aircraft Corp., Lambert-St. Louis Municipal Airport, St. Louis, asks bids on general contract until Sept. 10 for one-story plant on adjoining tract, for production of aircraft parts for government. Main unit will total about 45,000 sq. ft. of floor space, with several smaller structures. Fund of \$532,500 will be furnished by Defense Plant Corp., Washington, Palmer & Lamdin, 1020 St. Paul Street, Baltimore, are architects.

Hercules Powder Co., Delaware Trust Building, Wilmington, Del., has awarded contract to Bechtel-McCone-Parsons Corp., 601 West Fifth Street, Los Angeles, engineer, for new plant at Louisiana, Mo., for production of synthetic ammonia for government, comprising several one and multi-story production units, storage and distributing buildings, power house, machine shop and auxiliary structures. Cost about \$17,000,000. Fund in that amount will be provided by Defense Plant Corp., Washington.

Detroit Gasket & Mfg. Co., 12640 Burt Road, Detroit, plans one-story addition and improvements in present plant. Cost close to \$50,000 with equipment. H. D. Ilgenfritz, 468 Prentiss Street, is architect.

Olds Motor Works, Division of General Motors Corp., Lansing, Mich., has let general contract to Francis J. Corr, Lansing, for underground, bomb-proof machine gun testing building, 60 x 125 ft., and 16 ft. high, for use in connection with machine gun manufacture at plant for government. Cost close to \$125,000 with equipment.

Burroughs Adding Machine Co., 6071 Second Street, Detroit, has plans by Albert Kahn Associated Architects & Engineers, Inc., New Center Building, for one-story addition, 65 x 600 ft., to branch plant at Plymouth, Mich. Cost over \$250,000 with equipment, instead of smaller sum previously noted.

Agerstand Corp., Muskegon, Mich., metal-treating, tool specialties, etc., is erecting one-story addition to double approximately present floor area. Cost about \$50,000 with equipment.

Edward Katzinger Co., 1949 North Cicero Avenue, Chicago, tinware and other metal specialties, has asked bids on general contract for two two-story additions, 208 x 223 ft., and 100 x 145 ft., respectively. Cost over \$175,000 with equipment. Alfred S. Alschuler and Ralph N. Friedman, Inc., 28 East Jackson Boulevard, is architect.

Stoner Mfg. Corp., Aurora, Ill., metal toys, games, etc., plans expansion for production of cartridge cases for government. Fund of \$350,000 is being secured through Defense Plant Corp., Washington, majority of fund to be used for purpose noted.

Bucyrus-Erie Co., 1100 Milwaukee Avenue, South Milwaukee, cranes, power shovels, clamshell excavators and other heavy machinery, has let general contract to Permanent Construction Co., 2712 North Holton Street, Milwaukee, for one-story addition. Cost over \$50,000 with equipment.

Washington Island Electric Co-operative, Inc., Washington Island, Wis., plans new electric power plant, using diesel engine-generating units and accessories. Fund of \$51,000 has been secured through Federal aid for project. Plans will be prepared under direction of Wisconsin Development Authority, 602 Tenney Building, Madison, Wis.

Department of Public Works and Buildings, Springfield, Ill., W. A. Rosenfield, director, has asked bids on general contract for new one-story machine shop, about 140 x 280 ft., at Crawford Avenue and 159th Street, Chicago. Cost over \$100,000 with equipment. C. Herriek Hammond, 160 North LaSalle Street, Chicago, is architect.

Northern Pump Co., Forty-eighth and N. E. Marshall Streets, Minneapolis, Minn., pumping machinery and parts, has let general contract to George F. Cook Construction Co., 2608 Nicollet Avenue, for two one-story additions, totaling 150 x 1720 ft., to branch plant at Fridley, where four one-story buildings have been erected for production of gun mounts for government. New additions will be used for similar manufacture. Cost over \$1,200,000 with equipment. Pasek & Shifflet, 914 Marquette Avenue, Minneapolis, are architects.

City Council, Mallard, Iowa, asks bids until Sept. 15 for erection of municipal power plant. K. R. Brown, Valley Bank Building, Des Moines, Iowa, is consulting engineer.

Western States

• **Todd-Seattle Shipbuilding, Inc.**, Harbor Island, Seattle, will begin work soon on new drydock at local yard, 90 x 410 ft., for repair and conversion of vessels for government. Cost about \$1,000,000 with equipment and shop facilities. New unit will have lifting capacity of about 5700 tons. This is part of expansion to be carried out at plant.

Ryan School of Aeronautics, Hemet, Cal., has let contract to Oimstead Building Co., 3878 Fortieth Street, San Diego, Cal., for two hangars, with shop facilities and other structures. Cost about \$150,000 exclusive of equip-

ment. Frank L. Hope, Jr., San Diego Trust and Savings Building, San Diego, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 9 for one 12-in. self-contained bevel gear generator, arranged with full standard and special equipment, motor-driven, for yard at Keyport, Wash. (Schedule 8310), four motor-driven surface grinders for Western Navy yards (Schedule 8424), 50 5000-gal. underground steel gasoline tanks for Mare Island Navy Yard, Cal.; also for 40 and 25 similar tanks, same capacity, for Navy yards at Charleston, S. C., and Brooklyn (Schedule 8447).

Blue Diamond Corp., 1650 South Alameda Street, Los Angeles, plaster, wallboard, lime and kindred materials, plans new works for wallboard manufacture at Arden, Nev., near raw material properties, consisting of one-story units for processing, finishing, storage and distribution, etc. A power house will be built. Cost over \$400,000 with machinery.

Silver Eagle Co., 3149 North Willamette Street, Portland, motor truck parts, etc., plans new one-story plant, 80 x 100 ft., at 5885 N. W. St. Helens Road, for shop, storage and distribution. Cost close to \$40,000 with equipment.

Visalia-Dinuba School of Aeronautics, Inc., Visalia, Cal., plans new government pilot training school, consisting of hangars, shops and other mechanical buildings. Cost about \$264,000 with equipment. Fund in that amount is being secured through RFC for project.

Electrol Oil Burner Co., 314 Stewart Street, Seattle, has let general contract to Hainsworth Construction Co., 1822 McGilvra Street, for two-story shop addition, 73 x 120 ft. Cost over \$45,000 with equipment. Donald D. Williams, Textile Tower Building, is architect.

Canada

• **Sangamo Electric Co., Ltd.**, 193 George Street, Toronto, electric meters, parts and other electrical equipment, will begin superstructure for one-story addition to plant in Leaside district, for which general contract recently was let to Anglin-Norcross Ontario, Ltd., 57 Bloor Street West. Cost over \$125,000 with equipment. Harkness & Hertzberg, last noted address, are architects and engineers.

Distillers Corp., Ltd., 1430 Peel Street, Montreal, has let general contract to A. F. Byers & Co., Ltd., 1226 University Street, for seven-story storage and distributing building, 100 x 100 ft., at Ville La Salle, near city. Cost close to \$250,000 with equipment. B. R. Perry, 620 Cathcart Street, is architect and engineer.

Dominion Electric Home Industries, Ltd., Edward Street, Kitchener, Ont., has let general contract to Ball Brothers, Ltd., 49 King Street East, for one-story addition, 60 x 100 ft., for a machine shop. Cost about \$65,000 with equipment. J. C. Klaehn, last noted address, is architect.

Hamilton Bridge Co., Ltd., 231 Bay Street North, Hamilton, Ont., plans an addition, 70 x 80 ft., to cost about \$140,000.

Canadian Aircraft Instruments & Accessories, Ltd., Vanderhoof Drive, Leaside, Toronto, will start work soon on second unit of plant to provide 14,000 sq. ft. of floor space. Cost, with equipment, about \$75,000.

Morrow Screw & Nut Co., Ltd., Ingersoll, Ont., bolts, drills, etc., has awarded general contract to H. Ogden, for plant addition to cost \$25,000 without equipment.

McKinnon Industries, Ltd., Ontario Street, St. Catharines, Ont., automobile parts, has awarded general contract to Ontario Construction Co., 31 Queen Street, for a plant addition, to cost about \$100,000 with equipment. A. G. Nicholson, 46 Queen Street, is architect.

Kelvinator of Canada, Ltd., 1152 Dundas Street East, London, Ont., electric refrigerators, etc., plans one-story addition to plant, to cost about \$50,000 with equipment.